April 1999
QUARTERLY SAMPLING REPORT AND ANNUAL GROUNDWATER MONITORING PHIBRO-TECH, INC.

Santa Fe Springs, California

July 21, 1999

Prepared for:

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CDM Project No. 2279-11463-111.REP.REPT

PHIBRO-TECH, INC.

July 27, 1999

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Dear Messrs. Ross, Leach and Kou:

Enclosed is the Second Quarter 1999 Quarterly Groundwater Monitoring Report for Phibro-Tech, Inc., Santa Fe Springs facility. The Report includes analytical results and physical measurements obtained April 19-21, 1999 from selected monitoring wells at Phibro-Tech. Since this Report includes portions of the RCRA Facility Investigation (USEPA Docket No. RCRA 09-89-0001), this Report is also submitted to EPA.

Based on a technical review by our consultant, Camp Dresser and McKee, a groundwater monitoring program is included which was implemented beginning with the April 1991 groundwater monitoring. Additional wells and parameters changed at the request of EPA are included in this Groundwater Monitoring Report. The changes are described in the Report. Please contact me if you have any questions or comments concerning this Report.

Very truly yours,

E E Vigil

E. E. Vigil
Environmental and Safety Manager

EEV/kn/qtrgrdwtrrpt
Enclosure

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Section 1
Introduction

This report summarizes the 52nd RCRA quarterly groundwater monitoring sampling and analyses period at the Phibro-Tech, Inc. (PTI), Santa Fe Springs, California facility (formerly referred to as Southern California Chemical). Contained herein are the results of laboratory analyses of groundwater samples and water level measurements obtained during the period of April 20 to April 26, 1999.

The purpose of the groundwater sampling program, which began in March 1985, is to determine if hazardous waste constituents are migrating from the facility to the groundwater beneath the site. This is accomplished through the comparison of background or up gradient water quality and groundwater quality beneath the site. Statistically-significant increases in contaminant concentrations between known areas of groundwater contamination and downgradient wells would indicate that migration is occurring. In the past, statistical analysis was performed annually and was included in the July quarterly monitoring reports. Statistical analysis is now conducted each quarter and is included in the corresponding monitoring report. The April 1999 statistical analysis is contained in Appendix E of this report.

To date, three types of contaminants have generally been detected in the groundwater beneath the site: soluble metals (primarily chromium and cadmium), purgeable aromatic organic compounds (toluene, ethylbenzene and total xylenes) and purgeable halogenated organic compounds (i.e., solvents, primarily trichloroethene [TCE]). Groundwater modeling completed in January 1993, and groundwater monitoring conducted since 1985, indicate that the purgeable aromatic plume originated up gradient from the PTI facility. The distribution of TCE appears to be ubiquitous, however, somewhat elevated concentrations exist in the vicinity of Pond 1, a RCRA-regulated former surface impoundment area. Elevated concentrations of soluble metals have also been consistently detected in the vicinity of Pond 1. Soluble metal concentrations at the down gradient property line and in deeper wells, however, continue to be negligible to non-detect.

Approximately 15 years of quarterly groundwater monitoring at the PTI facility has indicated a general lack of hexavalent chromium migration. During groundwater modeling performed by CDM in 1993, a retardation factor of 50 was selected based on the observed distribution of hexavalent chromium in the groundwater. Previous data analysis indicated that the most likely basis for the relatively high (but within the range of reasonable and appropriate values) retardation factor would be the existence of reducing conditions in the saturated zone, promoting the conversion of hexavalent chromium to trivalent chromium (Cr^{3+}). Trivalent chromium, having a very low solubility in water, would tend to precipitate and sorb to the soil, limiting migration. During four quarterly sampling events conducted in 1996, additional laboratory analyses (iron and redox potential) were performed on groundwater samples collected from wells MW-04, MW-09, and MW-14S. These additional data, along with the pH, total chromium, and hexavalent chromium data, provided a better understanding of the mechanisms controlling chromium migration in groundwater underlying the facility and supported the above hypothesis. Please refer to Section 6.4 (Chromium Fate and Transport) of the October 1996 Quarterly Sampling Report for a detailed discussion of this conclusion.

In addition to the data obtained during the April 1999 sampling, this report contains tables listing detection limits of the parameters analyzed (Appendix A). Copies of the original laboratory results are included in Appendix B. Chain-of-custody records for the April 1999 sampling are included in Appendix C. Appendix D contains background groundwater concentrations of contaminants for the Santa Fe Springs area for the year 1996. Appendix E contains the complete quarterly statistical analysis.

Prior to October 1993, quarterly reports have included analytical result summary tables from all previous sampling rounds. Starting with the October 1993 quarterly report, historical water quality data tables are no longer included in the report as an appendix. Please refer to Appendix B in the July 1993 Quarterly Sampling Report for a summary of historical groundwater analytical data. A summary table of key historical results since January 1989 is provided in Section 6 (Table 6-1) of this report.

Section 2
Monitoring Well Sampling

Groundwater sampling, utilizing existing on-site monitoring wells, was conducted by CDM personnel during the period of April 20 to April 26, 1999. Field activities were performed in general accordance with the groundwater sampling protocol as outlined in Section 4.3.3 of the approved RCRA Facility Investigation (RFI) Work Plan (CDM, June 1990). Prior to the submittal of the RFI Work Plan for regulatory agency review and approval, the J.H. Kleinfelder and Associates (Kleinfelder) Quality Assurance Project Plan (QAPP, May 1988) was used as the primary groundwater sampling guidance document. Proposed deviations from the RFI Work Plan (i.e., well purging using a submersible pump and sample collection using disposable bailers) were discussed in October 1994 correspondence to the DTSC. These changes were implemented during the October 1994 and all subsequent sampling events.

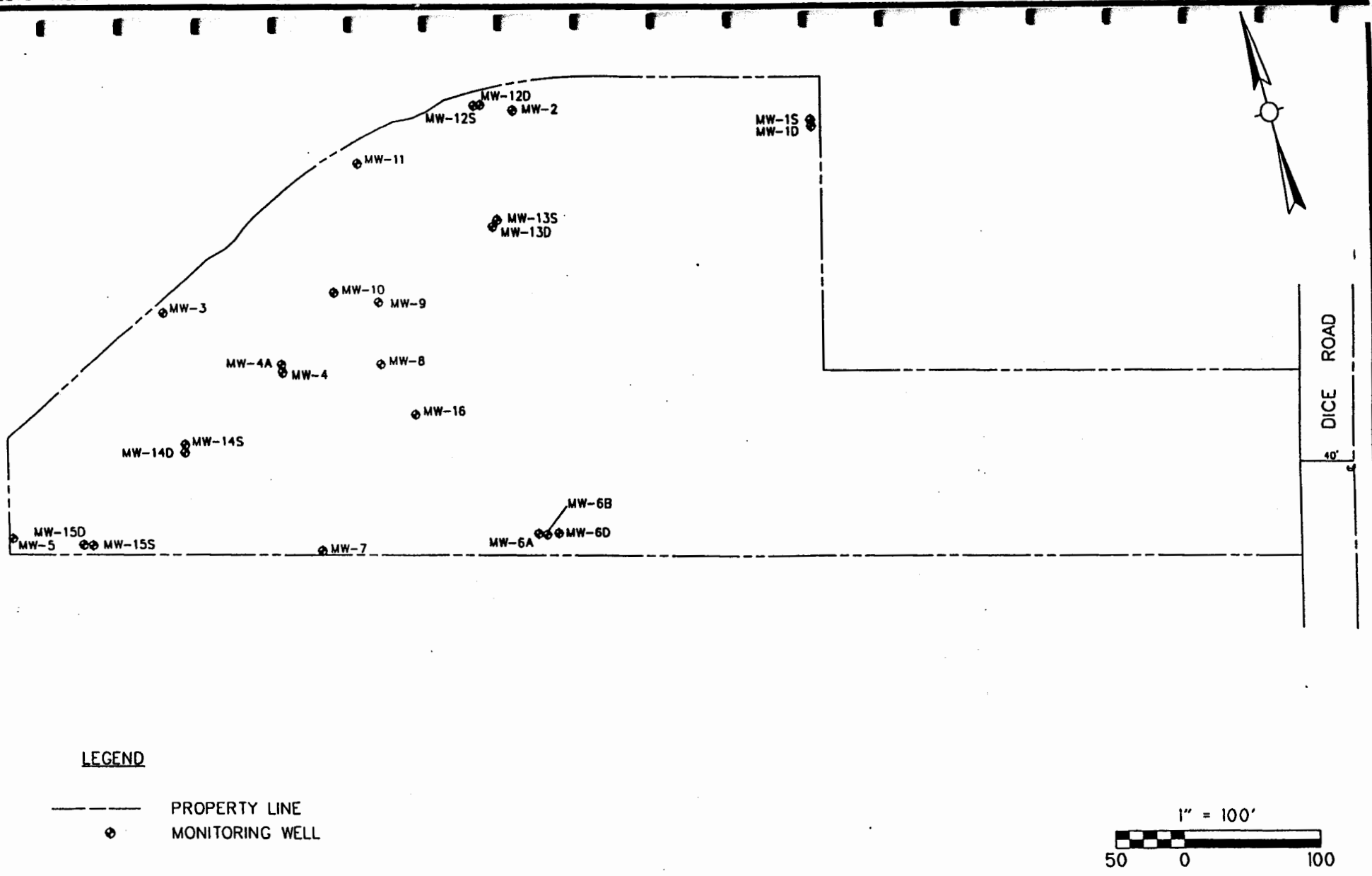
Twenty-four monitoring wells exist on-site. The locations of these wells are shown on Figure 2-1. One well, MW-06A, historically has not been sampled for groundwater analysis because it is screened in the Gage Aquifer, which is unsaturated below the PTI facility. The remaining wells are screened in the Hollydale Aquifer; 16 in the upper portion and seven in the lower portion of the aquifer.

Beginning in February 1985, Kleinfelder initiated groundwater sampling, utilizing monitoring wells MW-01 through MW-06B. Six additional wells (MW-04A and MW-07 through MW-11) were installed at the site in July 1985, thereby increasing the total number of active wells to 12. Quarterly sampling of the 12 wells was initiated in March 1986.

Commencing with the January 1989 sampling event, CDM has been responsible for all groundwater monitoring activities at the facility. Ten wells (MW-01D, MW-06D, MW-12S, MW-12D, MW-13S, MW-13D, MW-14S, MW-14D, MW-15S and MW-15D) were constructed as part of the first phase of the RFI program and were first sampled during the October 1990 sampling round.

Groundwater analysis of the 22 wells which existed during the RFI program from October 1990 to January 1991, indicated that the number of wells sampled could be reduced and yield comparable results to sampling all the wells. During the April, July, and October 1991, and January 1992 sampling rounds, the 11 wells sampled included 8 wells (MW-01S, MW-03, MW-04, MW-07, MW-09, MW-11, MW-14S, and MW-15S) screened in the upper portion of the Hollydale Aquifer and three wells (MW-01D, MW-04A, and MW-15D) screened in the lower portion of the Hollydale Aquifer.

Beginning with the April 1992 sampling round, three additional wells (MW-06B, MW-06D, and MW-16) were included in the quarterly monitoring program, bringing the total number of sampled wells to 14. A new well, MW-16, constructed in March 1992 as part of the Phase II RFI program, was sampled for the first time during the April 1992 sampling round. The same 14 wells have been sampled during all subsequent sampling rounds. On several occasions, additional laboratory analyses have been performed and additional wells included in quarterly sampling, at the request of the U.S. EPA. Additional analyses and wells are noted in the comments column of Table 2-1, which summarizes the groundwater monitoring program at the site.



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

MONITORING WELL LOCATION MAP

CDM
environmental engineers, scientists, planners, & management consultants

Figure 2-1

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
3/85	Quad	Cu & Zn	X	X	X	--	--	Sampled wells MW-1, 2, 3, 4, 5, & 6B. Sulfide, nickel, copper and zinc requested by DOHS and RWQCB. Also Appendix III parameters and water quality parameters (see footnote).
7/85	Quad	Cd, Cr	X	--	X	--	--	Sampled wells MW-4A, 7, 8, 10 and 11
3/86	Quad	Cu & Zn	X	X	X	--	--	Sampled 12 wells (MW1, 2, 3, 4, 4A, 5, 6B, 7, 8, 9, 10 & 11). Also Appendix III parameters and water quality parameters (see footnote).
7/86, 9/86, 12/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
3/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Sampled 11 wells, not 4A
7/87, 10/87, 2/88	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event
6/88	X (not Quad)	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis (t-test) on Indicator Parameters (IPs).
9/88	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	IPs & volatile organics from MW1, 2, 4A, 5, 6, 7 analyzed semi-annually in June/Dec.
1/89	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After Jan. 1989, volatile organics analyzed for all 12 wells.
4/89	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
7/89	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis of Jan. thru July 1989 data (IPs, total and hexavalent chromium).
10/89	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/90	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
4/90	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
7/90	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis of Jan. 1989 data (IPs, total and hexavalent chromium).
10/90	--	Cd, Cr, Cu, Fe, Ni, Pb, Zn	X	X	X	601/602	X	Sampled 22 wells, Appendix IX parameters analyses were performed on wells 4, 4A, 6B, 6D, 12S, 12D, 15S, 15D, plus a duplicate of 4.
1/91	Quad	Cd, Cr, Cu, Fe, Ni, Pb, Zn	X	X	X	601/602	--	Sampled 22 wells.
4/91	pH	Cd, Cr, Cu	X	--	--	601/602	--	New sampling program was initiated. Sampled 11 wells including wells MW-01S, MW-01D, -03, -04, -04A, -07, -09, -11, -14S, -15S, -15D.
7/91	pH	Cd, Cr, Cu	X	--	--	601/602	--	Performed annual statistical analysis.
10/91	pH	Cd, Cr, Cu	X	--	--	601/602	--	
1/92	pH only (all) TOC only (MW-01 & -04)	Cd, Cr, Cu	X	--	Ammonia as nitrogen (MW-01 & -04)	601/602	--	Ammonia & TOC analyses added at MW-01S and MW-04.
4/92	pH only TOC only (MW-01 , -04, -09, -14S)	Cd, Cr, Cu-all see coments	X	--	Ammonia as nitrogen (MW-01, -04, -09, -14S)	601/602	EDB (MW-04) TPH (W-16)	Sampled 14 wells including Wells MW-01S, -01D, -03, -04, -04A, -06B, -06D, -07, -09, -11, -14S, -15S, -15D, -16. Additional analysis as part of Phase II RFI; unfiltered metals on MW-04S and -14S. Pb and Ni on wells 1, 4, 14S, 15S, 16; Fe, Zn on well 16.
7/92	pH	Cd, Cr, Cu	X	--	--	601/602	--	Sampled 14 wells. Performed annual statistical analysis.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
10/92	pH	Cd, Cr, Cu	X	--	--	601/602	--	Sampled 14 wells.
1/93, 4/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells.
7/93	pH	Cd, Cr, Cu	X	--	--	8010/8020 (TVPH, TEPH)	--	Sampled 15 wells. (MW-13S was added) TVPH and TEPH analysis on MW-09, 13S, and 16 only. Performed annual statistical analysis.
10/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 15 wells (MW-13S not analyzed for metals and pH) TVPH & TEPH analysis on MW-04, 07, 09, 13S, and 16 only. Performed statistical analysis.
1/94, 4/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
7/94	pH	Cd, Cr, Cu	X	See comment	--	8010/8020	--	Sampled 14 wells, chloride and sulfate analyses on MW-04, MW-09, MW-14S, MW-15S, MW-15D, and MW-16. Performed statistical analysis
10/94, 1/95, 4/95, 7/95, 10/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
1/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis. 1995 Annual Report included as Appendix F.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
4/96, 7/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
10/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis. 1996 Annual Report included as Appendix F.
1/97	pH	Cd, Cr, Cu	X	--	--	8260, MTBE	--	Sampled 14 wells Performed statiscal analysis.
4/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
7/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
10/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. 1997 Annual Report included as Appendix F.
1/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. Hexavalent Chromium by Method 7196 in all wells; and by Method 218.6 in wells MW-4A, MW-14S, MW-15S, and MW-15D.
4/98, 7/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

10/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. 1998 Annual Report included as Appendix F.
1/99, 4/99	pH	Cd,Cr,Cu	X	--	--	8260	_	Sampled 14 wells Performed statistical analysis.

Appendix III Parameters -	As, Ba, Cd, Cr, F, Pb, Hg, N, Se, Ag, Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D, 2,4,5-TP (Silvex), Radium, Gross Alpha & Beta, Turbidity, coliform bacteria.
Water Quality Parameters -	Cl, Fe, Mn, Phenols, Na, SO4
Indicator Parameters (IP) -	TOX, TOC, pH, EC (quadruplicate)
624 -	Volatile organics analysis
601/602 -	Purgeable halocarbons/aromatics analysis
8010/8020 -	Purgeable halocarbons/aromatic analysis
8260 -	Purgeable halocarbons/aromatic analysis
MTBE -	Methyl tertiary butyl ether
Appendix IX Parameters -	See Appendix F in the October 1990 Quarterly Sampling Report for a complete listing of parameters.

The 14 wells currently included in quarterly sampling are MW-01S, MW-01D, MW-03, MW-04, MW-04A, MW-06B, MW-06D, MW-07, MW-09, MW-11, MW-14S, MW-15S, MW-15D, and MW-16. Ten shallow and four deep wells are analyzed for pH, metals (cadmium, chromium, and copper using EPA Method 6010A; and hexavalent chromium using EPA Method 7196), and purgeable halogenated/aromatic organic compounds (EPA Method 8260). A detailed listing of analytical parameters per sampling event is provided in Table 2-1.

Beginning with the July 1993 sampling event, the 14 wells have generally been purged and sampled in the following order: MW-01, MW-01D, MW-03, MW-11, MW-06B, MW-06D, MW-07, MW-04A, MW-04, MW-14S, MW-15S, MW-15D, MW-16, and MW-09.

2.1 Sampling Procedure

Field sampling was conducted in general accordance with procedures detailed in the RFI Work Plan. Sampling practices included efforts to detect floating product and hydrocarbon vapors at each well, measurement of the static water level and total depth of each well for calculating pre-sampling evacuation volumes, purging and sampling of groundwater for laboratory analysis, decontamination of sampling equipment, and handling of sample-filled containers in accordance with Section 4.3.3.5 of the RFI Work Plan. In general, these procedures were consistent with previous quarterly sampling by Kleinfelder. Details of previous procedures have been discussed in prior Quarterly Sampling Reports.

2.1.1 Organic Vapor Check

Standard field procedures include checking the interior of each well with a photoionization detector (PID) (equipped with a 10.0 eV lamp) for the presence of organic vapors whenever the well casing is opened. With the sampling team members standing upwind of the well, the well cap was opened slightly, allowing for the insertion of the PID probe tip inside the well. Readings were monitored until they stabilized, which was usually at zero parts per million (ppm). The final reading, as well as the peak reading, were recorded in the field log book. The cap was then removed and the well allowed to vent for a short period of time prior to measuring the static water level. The maximum PID readings taken during the collection of water level measurements are shown in Table 5-1 in Section 5.

2.1.2 Detection of Immiscible Layers

In order to detect the presence of floating, immiscible layers on top of the groundwater surface, a clear bailer was lowered approximately one-half the length of the bailer below the surface of the water in each well. The bailer was removed from the well and its contents checked for immiscible layers or iridescence. The PID probe was also inserted inside the bailer to check for volatile emissions. If immiscible fluids had been detected, a sample would have been collected for laboratory analysis of purgeable halocarbons and aromatics (EPA Method 8260) and total petroleum hydrocarbons (California Department of Health Services [CA DHS] Method). The bailer was decontaminated and the sampling line discarded after each use. As in all previous quarterly groundwater sampling at the PTI facility by CDM, immiscible layers were not detected during the April 1999 sampling event.

2.1.3 Static Water Level/Well Depth Measurement

On April 20, 1999, prior to the initiation of on-site well pumping, the static water level at 22 of the 24 on-site wells was measured three times at each well location with a decontaminated electric water level indicator (sounder) and recorded. The measurements collected in the wells were identical, therefore, there was no need to collect additional measurements or average the data of these wells. The results of these measurements are shown in Table 5-1 and discussed in Section 5. One well (MW-06A) was dry, and MW-02 was not measured due to its proximity to MW-12S.

The water level in each well was also measured immediately prior to initiating well evacuation procedures for calculation of well purge volume. During measurement, the measuring (reference) point used was noted (i.e., the top of the steel casing), and the depth to water below the reference point was measured to the nearest 0.01 foot and recorded in the field log book. Well head elevation data was used with depth to water measurements to calculate groundwater elevation at each well location.

The bottom of each well sampled was also measured with the sounder to the nearest 0.1 foot. The amount of fill material in the bottom of the well was calculated from well construction data and noted in the log book. Prior to first use, the sounder was calibrated and the meter response checked. The sounder probe and line were decontaminated after each use.

2.1.4 Purge Volume Determination/Well Evacuation

Saturated casing volume was calculated at each well by using the depth to water and bottom sounding measurements obtained immediately prior to purging, to calculate the amount (height) of the saturated well casing. The inside diameter of the casing was then measured, and the following formula applied:

$$\text{Volume} = \pi \text{ radius}^2 \text{ x height}$$

A minimum of three saturated casing volumes of water were evacuated from each well prior to collecting a groundwater sample for laboratory analysis.

During the April 1999 sampling round, all 14 of the wells currently monitored were purged using a Grundfos 2-inch diameter submersible pump, and each well was sampled using a new disposable bailer.

For measurement of field parameters during well evacuation, a Hach Model 2100P turbidity meter, an Orion 250A pH meter, and a YSI Model 33 electrical conductivity (EC)/temperature meter were used. The instruments were calibrated or field checked prior to use with standard solutions in accordance with manufacturer's directions. The meters are used to determine the stability of discharge water field parameters prior to collection of a sample for laboratory analysis.

Periodically during well evacuation, the field parameters of the discharge water were measured and recorded in the log book. The physical appearance of the water (turbidity, color, sediment content, etc.) was also noted and recorded. Initial field turbidity measurements generally ranged from 0.72 to 941 NTUs (nephelometric turbidity units) at the start of well evacuation. At the end of well

evacuation, measurements were generally less than 10 NTUs. Higher turbidity at the start of purging seems to be related to agitating the water column and resuspending material from the bottom of the well during pump installation. After a minimum of three saturated casing volumes of water were evacuated from each well and the field parameters stabilized (change between readings of less than 5 to 10 percent), a sample for laboratory analysis was collected.

All purge water collected from each well was discharged directly into 55-gallon barrels for treatment by PTI in the facility's wastewater treatment system.

2.1.5 Sample Collection and Handling

Groundwater samples were collected with a disposable bailer from the approximate middle of the perforated section, and poured directly into previously-labeled sample bottles. During sample collection, the bailer was carefully and gently lowered past the air/water interface to minimize agitation and aeration of water during sample collection. The sample bottles were placed inside plastic zip-lock bags and then placed immediately into an ice-cooled chest. Prior to shipment, the bottles were cushioned with bubble wrap or plastic bags to avoid breakage. Samples collected for total metals analysis were field filtered using a 0.45 micron filter. Filters were discarded after each use.

The April 1999 groundwater samples were collected for laboratory analysis of the following parameters:

- Halogenated/Aromatic Volatile Organic Compounds by EPA method 8260
- Metals (Cd, Cu, and Cr)
- Hexavalent Chromium (Cr^{+6})
- pH

Groundwater sample bottles were numbered using the following format:

PTI-MW01S-043

Where:

PTI	-	designates site acronym
MW01S	-	designates sample location number (MW = Monitoring Well)
EB	-	designates equipment blank sample
TB	-	designates travel blank sample
043	-	designates sequential sample number (per sampling event)

This was the 42nd round of sampling conducted by CDM, however, due to a previous labeling inconsistency, a 043 sequence number was assigned to all groundwater samples collected during this round. Sample label information included date and time of sampling, CDM sample number, and analytical parameters.

All filled sample containers that were collected from each well were accompanied by chain-of-custody forms that indicated the label information as well as the responsible person during each step of the transportation process. All samples were sent by courier to Quanterra Laboratories in

Santa Ana, California on the day that they were collected, and a copy of the chain-of-custody form for that day was retained by CDM field personnel. Copies of completed chain-of-custody forms are included in Appendix C. The laboratory was notified at the time of delivery that one or more hexavalent chromium (Cr^{+6}) sample(s) were contained in the shipment to ensure that the samples would be analyzed within the prescribed 24-hour holding period.

2.2 Equipment Decontamination Procedures

The following sections describe the procedures utilized to decontaminate groundwater sampling equipment.

2.2.1 Sampling Pump/Lines Decontamination

The submersible pump and discharge tubing used for well purging were decontaminated to reduce the possibility of cross-contamination between monitoring wells. The first step in the decontamination procedure was to submerge the pump into a decontaminated 5-gallon bucket containing a soap (Alconox, a laboratory-grade detergent) and water mixture, and pump at least five gallons of the solution through the system. The pump assembly was then submerged in another 5-gallon bucket filled with tap water and at least 10 gallons were pumped through the system. The final decontamination step was accomplished by submerging the pump into a decontaminated 5-gallon bucket containing deionized (DI) water and pumping approximately five gallons of DI water through the system.

The exterior of the pump and discharge tubing was steam cleaned, as well as the exterior of the reel holding the tubing. The decontamination of the exterior pump line was performed over a plastic waterproof tarp. The tarp was placed on a gently sloping surface and bermed up at the edges, allowing the decontamination water to flow away from the equipment being cleaned. The spent water was recovered and stored in 55-gallon drums for treatment by PTI in the facility's wastewater treatment system.

2.2.2 Accessory Sampling Equipment Decontamination

Accessory sampling equipment such as the metals filter apparatus, bailer, and water level sounder were also decontaminated to minimize the possibility of cross-contamination between the monitoring wells. The filter apparatus, bailer, and sounder were decontaminated first by washing in a bucket of soap and water, followed by a tap water rinse, followed by a final DI water rinse. Bailers used to test for an immiscible layer were decontaminated and reused. The bailers and nylon rope that were used to sample wells were discarded immediately after use.

Section 3
Laboratory Testing

Analytical and duplicate testing of groundwater samples collected during the April 1999 monitoring event was provided by Quanterra Laboratories of Santa Ana, California. During the April 1999 quarterly sampling event, a total of 21 water samples were submitted for laboratory analysis. Fourteen monitoring well samples and two blind duplicate samples from MW-04 and MW-09 were collected and submitted to Quanterra for analysis of purgeable halocarbons/aromatics (EPA Method 8260), cadmium, total and hexavalent chromium, copper, and pH. In addition, two equipment blank samples were submitted for analysis of the above parameters. Three travel blanks (TB) were also submitted to Quanterra for analysis of purgeable halogenated/aromatic organics.

The April 1999 groundwater analytical results are discussed in Section 6 and summarized in Tables 6-1 through 6-4. Quality assurance analytical results (duplicates, equipment blanks, and travel blanks) are discussed in Section 4.0 and summarized in Tables 4-1 through 4-4. Individual analytical reports for April 1999 are contained in Appendix B.

Section 4
Quality Assurance

To verify the accuracy and validity of analytical data, certain quality assurance procedures were implemented. The field and laboratory quality assurance results were checked for deviations from the Quality Assurance (QA) guidelines discussed in the RFI Work Plan.

4.1 Field Quality Assurance

The field QA procedures included the use of duplicate samples, equipment blanks, travel blanks, and the use of chain-of-custody forms. The results of the QA analyses have been compiled by type of parameter: purgeable halogenated organics, purgeable aromatic organics, and inorganics, in Tables 4-1 through 4-3, respectively. Table 4-4 lists quality assurance results which are outside the ranges specified in the RFI Work Plan. Detection limits of parameters analyzed are shown in the analytical reports contained in Appendix B.

4.1.1 Duplicate Samples

Standard accepted practice is to submit one duplicate sample for analysis for approximately every tenth sample collected, a ratio of 1 to 10. During the April 1999 round of sampling, duplicate samples were collected from monitoring wells MW-04 and MW-09. The duplicate samples were submitted to the analytical laboratory as blind samples, and were designated MW-35 and MW-37, respectively, on the chain of custody forms. Monitoring wells MW-04 and MW-09 were selected due to elevated concentrations of certain contaminants detected during previous sampling rounds. Analytical results for the duplicate samples for April 1999 are shown in Tables 4-1, 4-2, and 4-3.

Duplicate results which deviate greater than 20% from the original results are shown in Table 4-4. There was a 707% difference in hexavalent chromium and a 24% difference in total xylenes between sample PTI-MW04-043 and its duplicate, PTI-MW35-043. Quanterra Laboratory was contacted and confirmed their data. Their conclusion was PTI-MW04-043 and PTI-MW35-043 were not duplicates and were mislabeled in the field. CDM believes that these samples were duplicates based on evaluation of the results of the remaining analytes. The reason for this out-of-range deviation could not be determined.

Seven out of the eleven purgeable halogenated organic compounds deviated greater than 20% between sample PTI-MW09-043 and its duplicate, PTI-MW37-043. The lowest deviation was 29% tetrachloroethene and the highest was 39% 1,1,1-trichloroethane for the duplicate sample and other wells sampled that day.

4.1.2 Equipment Blanks

Analytical results for the equipment blanks collected during April 1999 are shown in Tables 4-1, 4-2 and 4-3.

Equipment blank EB-01 was obtained by allowing deionized water to run through a new, precleaned, disposable bailer. The other equipment blank (EB-02) was obtained by pouring deionized water over the submersible pump after decontamination. The samples were collected in

the appropriate containers and submitted for laboratory analysis. Sample EB-01 was collected to evaluate the effectiveness of the factory cleaning process. Sample EB-02 was collected following pump decontamination after sampling well MW-16. The equipment blanks were submitted to the laboratory for analysis of purgeable halogenated/aromatic volatile compounds (EPA Method 8260), cadmium, chromium (total and hexavalent), copper, and pH. The analytical results did not indicate any detections above the method detection limits in either equipment blank.

4.1.3 Travel Blanks

The detection of compounds in travel blanks is generally indicative of systematic contamination from sample transport, laboratory glassware cleaning, laboratory storage, or analytical procedures. During the April 1999 sampling event, three laboratory-prepared travel blanks (TB01 through TB03) consisting of organic-free water were labeled and submitted to the lab for purgeable halocarbon and aromatic volatile organic analysis by EPA Method 8260. Each travel blank was stored with the day's samples, to be analyzed for volatile organic compounds. Tables 4-1 and 4-2 show the results of the travel blank analyses. The analytical results did not indicate any detections above the method detection limits in any of the three travel blanks.

4.1.4 Sample Control

All sample containers were labeled immediately prior to sampling with the sample identification information completed with a waterproof pen. Samples were transported under chain-of-custody and hand delivered by courier to the laboratory in ice-cooled chests. Copies of the chain-of-custody records are included in Appendix C.

4.2 Laboratory Quality Assurance

General QA procedures for Quanterra Laboratory, which performed laboratory analysis on all monitor well and quality assurance samples, are discussed in the RFI report. Quanterra provides internal laboratory QA/QC results with each sample analytical report. Matrix spike, matrix spike duplicate, method blank, and duplicate control sample results are noted in the QA/QC reports. In addition, surrogate recoveries are also noted for volatile organics analyses. The laboratory QA/QC results were within acceptable limits for the April 1999 sampling. The laboratory control sample results were also within acceptable limits.

TABLE 4-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Purgeable Halogenated Organic Analytical Results
(ug/L)

Sample Identification	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	1,1-Dichloro-ethene (1,1-DCE)	1,1-Dichloro-ethane (1,1-DCA)	1,2-Dichloro-ethane (1,2-DCA)	Chloroform (CHCL3)	cis-1,2-Dichloro-ethene (cis-1,2-DCE)	trans-1,2-Dichloro-ethene (cis-1,2-DCE)	1,1,1-Trichloro-ethane (1,1,1-TCA)	1,1,2-Trichloro-ethane (1,1,2-TCA)	Methylene chloride (CH2CL2)
PTI-EB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-EB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-MW04	ND <2.5	**190**	**40**	**64**	**66**	**10**	**68**	ND <2.5	ND <2.5	ND <2.5	**36**
PTI-MW04-DUP	ND <2.5	**190**	**43**	**66**	**68**	**10**	**68**	ND <2.5	ND <2.5	ND <2.5	**37**
PTI-MW09	**7.0**	**350**	**68**	**250**	**180**	**160**	**16**	ND <5.0	**16**	**5.0**	**200**
PTI-MW09-DUP	ND <5.0	**250**	**47**	**170**	**170**	**110**	**10**	ND <5.0	**9.8**	ND <5.0	**130**
PTI-TB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB03	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

TABLE 4-2
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Purgeable Aromatic Organic Analytical Results
(µg/L)

Sample Identification	Benzene	Toluene	Ethyl-benzene	Xylenes (Total)
PTI-EB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-EB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-MW04	**3.5**	ND <2.5	**220**	**9.9**
PTI-MW04-DUP	**3.6**	ND <2.5	**230**	**7.5**
PTI-MW09	ND <5.0	ND <5.0	ND <5.0	ND <5.0
PTI-MW09-DUP	ND <5.0	ND <5.0	ND <5.0	ND <5.0
PTI-TB01	ND <1.0	ND <1.0	ND <1.0	ND <2.0
PTI-TB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB03	ND <1.0	ND <1.0	ND <1.0	ND <1.0

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected.
NA = Parameter not analyzed.
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

TABLE 4-3
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Inorganic Analytical Results
(mg/L)

Well Identification	Cadmium EPA- 6010B	Chromium (Hexavalent) EPA- 7196A	Chromium (Total) EPA-6010B	Copper EPA-6010B	pH EPA-150.1
PTI-EB01	ND <0.0050	ND < 0.010	ND <0.010	ND < 0.025	**8.22**
PTI-EB02	ND <0.0050	ND < 0.010	ND <0.010	ND < 0.025	**6.66**
PTI-MW04	**0.41**	**0.57**	**42.8**	ND <0.050	**6.70**
PTI-MW04-DUP	**0.42**	**4.6**	**43.4**	ND <0.050	**6.61**
PTI-MW09	ND < 0.0050	ND < 0.010	**0.64**	ND < 0.025	**6.70**
PTI-MW09-DUP	ND < 0.0050	ND < 0.010	**0.60**	ND < 0.025	**6.91**

ND = Analytical parameter not detected.
NA = Parameter not analyzed.
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.

TABLE 4-4
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Quality Assurance Deviations

Quality Assurance Criteria	Cadmium (mg/l)	Chromium, Hexavalent (mg/l)	Chromium, Total (mg/l)	Copper (mg/l)	Benzene (ug/l)	Toluene (ug/L)	Ethyl-Benzene (ug/l)	Xylenes, Total (ug/l)	Halogenated Volatile Organic Compounds (ug/l)
Equipment Blanks									
PTI-EB01- 043									
PTI-EB02- 043									
Travel Blanks									
PTI-TB01- 043									
PTI-TB02- 043									
PTI-TB03- 043									
Laboratory Blanks									
Method Blank									
Duplicate Deviation (>20%)									
PTI-MW04- 043			**707%**					**24%**	
PTI-MW09- 043									**39%**
Holding Time Exceedance									

0.01/0.01 = Concentration/Detection Limit
MW - DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

Section 5
Groundwater Elevation

On April 20, 1999, prior to the initiation of well evacuation procedures, the depth to groundwater was measured in 22 of the 24 on-site monitoring wells. Groundwater elevations were calculated by subtracting the depth to static water level from the surveyed elevation of the corresponding monitoring well.

All of the monitoring well casing elevations were surveyed during the RFI and three wells (MW-04, MW-09, and MW-10) were resurveyed in January 1996 following wellhead repair. In July 1998, wellhead repairs were performed on wells MW-03, MW-06A, MW-06B, MW-06D, MW-08, MW-11, MW-12S, MW-12D, MW-13S, MW-13D, and MW-16. These wells were resurveyed during the July 1998 monitoring event.

During the April 1999 groundwater sampling round, water level measurements were taken at shallow wells MW-01S, MW-03, MW-04, MW-05, MW-06B, MW-07, MW-08, MW-09, MW-10, MW-11, MW-12S, MW-13S, MW-14S, MW-15S, and MW-16. Water level measurements were also taken at deep wells MW-01D, MW-04A, MW-06D, MW-12D, MW-13D, MW-14D, and MW-15D. These wells were measured in order to evaluate the direction and gradient of groundwater flow underlying the facility and to help characterize the shallow and deep aquifer interaction. Well MW-02 was not measured due to its proximity to MW-12S. Well MW-06A was measured and found to be dry.

Table 5-1 lists the depths to water and groundwater elevations for each well sampled. Figure 5-1 shows the approximate groundwater surface elevation of the upper Hollydale Aquifer for wells screened in the shallow interval (45 to 77 feet below ground surface) using data collected during the April 1999 sampling round. The contours shown in Figures 5-1 and 5-2 were generated by D.C.A., a surface contouring software developed by Softdisk, which is commonly used in conjunction with CADD (Computer Aided Drafting and Design) to produce contour maps and other graphics.

The direction of groundwater flow as observed in the shallow monitoring wells is approximately S 57° W at an average gradient of 0.39 feet per 100 feet in the western portion of the facility, where the majority of the monitoring wells are located. The gradient in the shallow wells has increased compared to the January 1999 gradient of 0.33 feet per 100 feet. The flow direction is comparable to that obtained in January 1999 (S 55° W).

Figure 5-2 shows the approximate groundwater elevation of the lower Hollydale Aquifer for wells screened in the deeper interval (78.3 to 123.5 feet below ground surface). Groundwater contours for the deeper wells follow the same general trend as those of the shallow wells. The direction of groundwater flow is approximately S 57°W at an average gradient of 0.40 feet per 100 feet. The gradient in the deep wells has increased compared to the January 1999 gradient of 0.38 feet per 100 feet, and the flow direction has a decreased westward component from that obtained in January 1999 (S 61°W) in the deep wells.

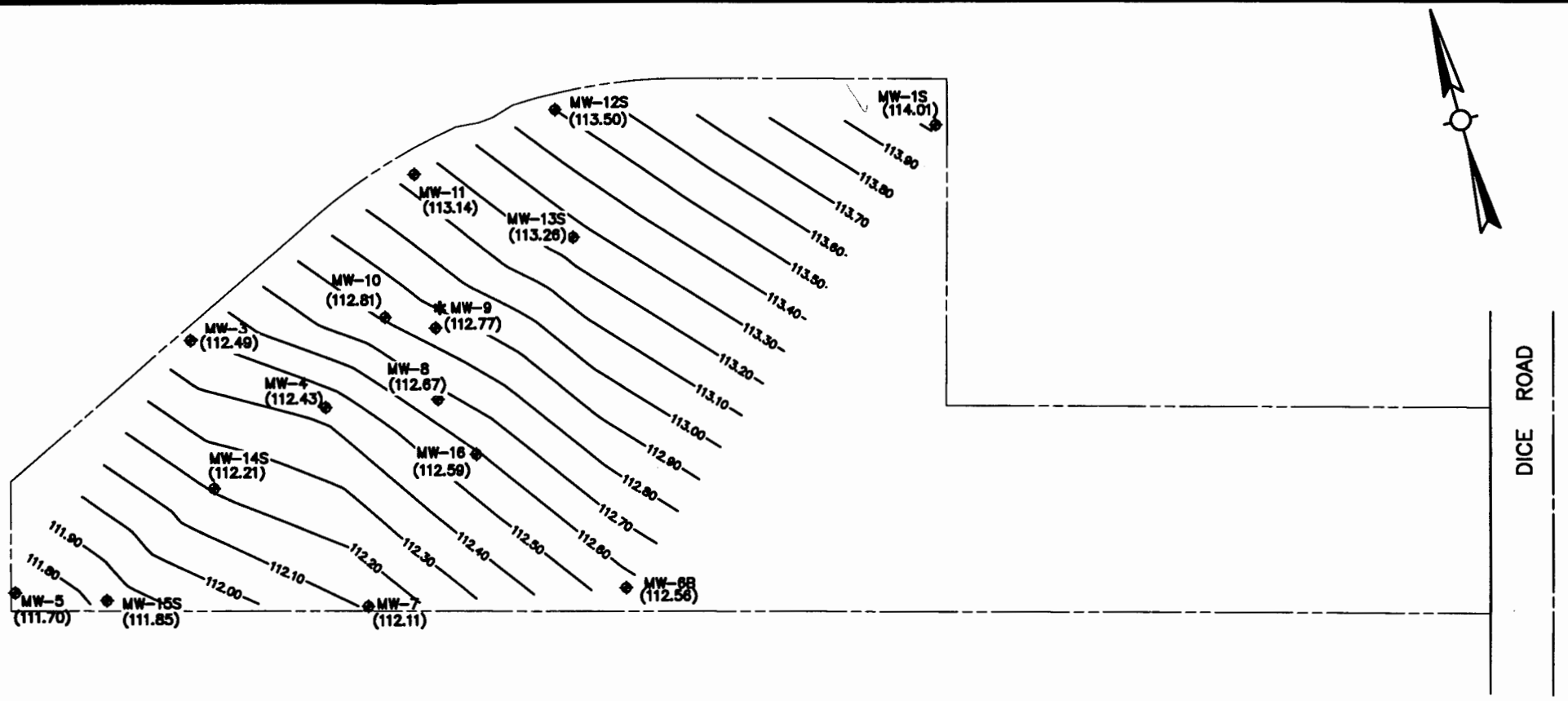
TABLE 5-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Groundwater Elevation Data

Well No.	Well Headspace* (ppm)	Total Depth Constructed (ft)	Total Depth Measured (ft)	Perforated Intervals (ft)	Calculated Casing Fill (ft)	M.P. Elevation (ft)	Depth to Water (ft below MP)	G.W. Elevation (ft above MSL)
1S	1.1 / 0.0	62.5	62.5	47-62.5	---	152.63	38.62	114.01
1D	1.1 / 0.0	94.8	95.9	79.5-94.5	---	152.60	38.59	114.01
3	8.1 / 0.0	74.1	73.3	45-75	0.8	154.75	42.26	112.49
4	17.5 / 0.0	67.5	67.8	45-75	---	152.37	39.94	112.43
4A	0.0 / 0.0	107.0	106.6	87-107	0.4	152.46	39.88	112.58
5	1.1 / 0.0	75.0	---	45-75	---	153.26	41.56	111.70
6A	117.0 / 0.0	---	---	10-30	---	---	DRY	---
6B	1.1 / 0.0	77.6	76.9	45-75	0.7	149.53	36.97	112.56
6D	5.8 / 0.0	95.5	90.3	79-94	5.2	150.13	37.51	112.62
7	3.5 / 0.0	71.5	71.5	45-75	0.0	149.42	37.31	112.11
8	37.2 / 0.0	71.0	---	41-71	---	150.17	37.50	112.67
9	86.5 / 0.0	73.5	73.5	44-77	0.0	152.96	40.19	112.77
10	71.8 / 0.0	75.0	---	45-75	---	153.89	41.08	112.81
11	79.2 / 1.1	75.5	73.8	55-75	1.7	155.76	42.62	113.14
12S	-	72.0	---	51-72	---	155.79	42.29	113.50
12D	1.0 / 0.0	101.0	---	84.5-100	---	155.72	42.22	113.50
13S	2.3 / 1.1	70.3	---	50.3-70.3	---	151.72	38.46	113.26
13D	1.1 / 0.0	93.3	---	78.3-93.3	---	151.68	38.45	113.23
14S	7.0 / 1.0	71.5	70.7	46-72	0.8	150.50	38.29	112.21
14D	0.0 / 0.0	109.0	---	88-103	---	150.56	38.35	112.21
15S	2.3 / 1.1	71.5	71.4	51.5-71.5	0.1	151.01	39.16	111.85
15D	1.1 / 0.0	123.8	123.9	108.5-123.5	---	150.96	39.15	111.81
16	14.0 / 1.1	62.5	62.0	42-62	0.5	150.27	37.68	112.59

M.P. = Measuring point (top of steel casing)
G.W. = Groundwater
--- = Not measured or not calculated.

MSL = mean sea level
* = Measured with PID prior to sampling (casing/background)
Note: Depth to water measurements collected on April 20, 1999 prior to purging/sampling on-site wells.

K:\2279-111\CAD\APRIL-99\ FIG5-1 06/03/99 11:51:39 8:48:36 Negretegd



LEGEND

———	PROPERTY LINE
◆	MONITORING WELL
(111.85)	GROUNDWATER ELEVATION (Feet Above MSL)
—113.00—	GROUNDWATER ELEVATION CONTOUR LINE (Feet Above MSL)
*	ANOMALOUS VALUE, NOT CONTOURED

1" = 100'

50 0 100

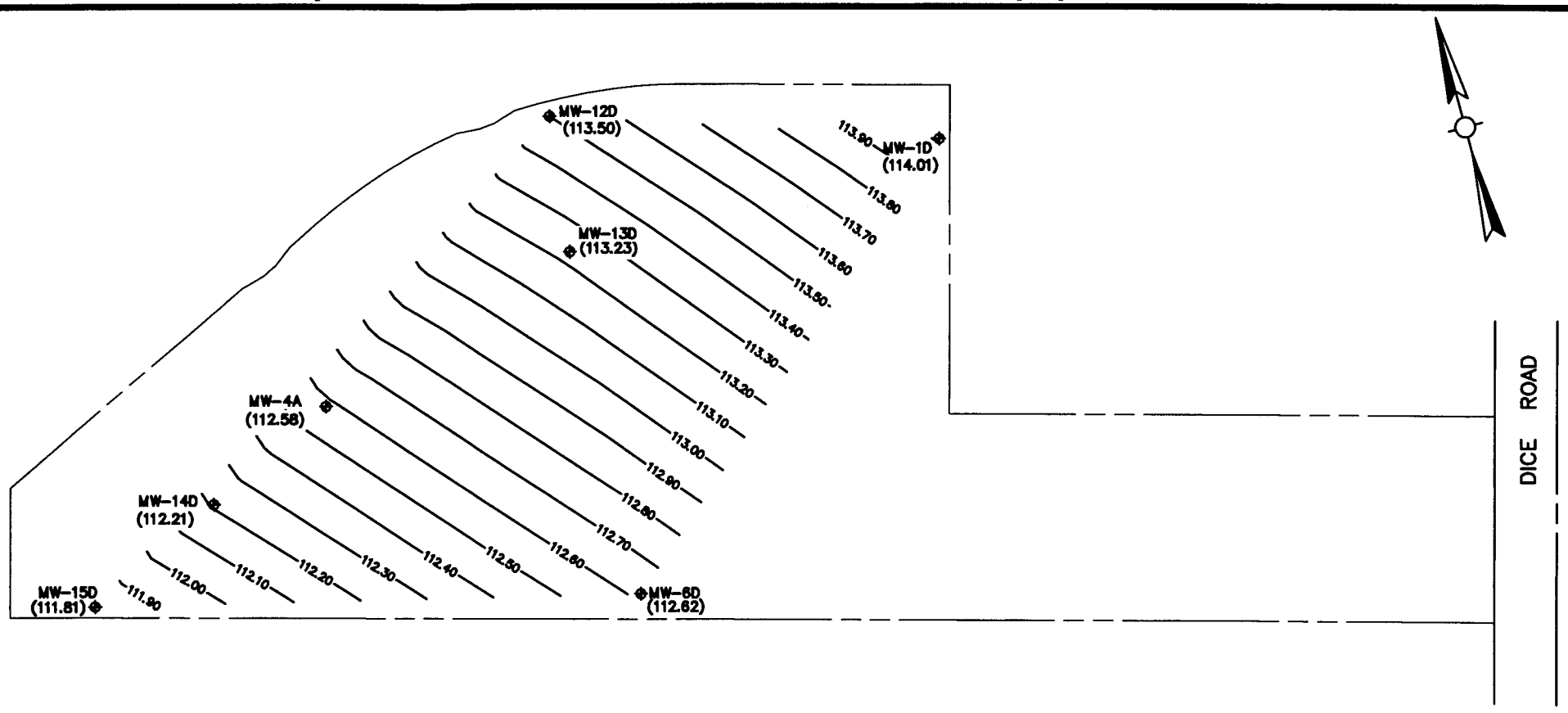
PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

GROUNDWATER ELEVATION CONTOURS – SHALLOW WELLS APRIL 1999

CDM
environmental engineers, scientists, planners, & management consultants

Figure 5-1

K:\2279-111\CAD\APRIL-99\ Fig5-2 06/03/99 13:17:25 6:55:39 Negretegd



LEGEND

———	PROPERTY LINE
◆	MONITORING WELL
(111.85)	GROUNDWATER ELEVATION (FEET ABOVE MSL)
113.00	GROUNDWATER ELEVATION CONTOUR LINE (FEET ABOVE MSL)

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

GROUNDWATER ELEVATION CONTOURS – DEEP WELLS APRIL 1999

CDM
environmental engineers, scientists, planners, & management consultants

Figure 5-2

With the 23 wells measured for water levels during the April 1999 sampling round, there were seven locations where a deep well was measured adjacent to a shallow well. Shallow wells are screened within the interval of 45 to 77 feet. Deep wells are screened within the interval of 78.3 to 107 feet, with the exception of MW-15D which is screened from 108.5 to 123.5 feet. Of the well pairs, groundwater elevations at deep wells MW-13D and MW-15D were slightly lower (0.03 and 0.04 feet, respectively) than the corresponding shallow well elevations. The groundwater elevations at deep wells MW-4A and MW-06D, were slightly higher (0.15 to 0.06 feet, respectively) than the corresponding shallow well elevations. Well pairs MW-1S and MW-1D, MW-12S and MW-12D, and MW-14S and MW-14D had the same groundwater elevations. Based on these and past groundwater elevation comparisons among shallow and deep well pairs, it does not appear that a well-defined vertical gradient between shallow and deep intervals exists.

Average groundwater elevations during the April 1999 sampling event decreased on from the previous quarter. Water level decreases ranged from a minimum of 0.05 feet at well MW-4A, to a maximum of 0.18 feet at MW-6B. Water level increases ranged from a minimum of 0.01 ft at wells MW-01D, MW-03, and MW-10, to a maximum of 0.13 ft at well MW-12D. The water level in well MW-12S remained the same.

Section 6
Groundwater Quality

In order to compare the analytical data from the previous sampling events (1989 through January 1999 quarterly events) with the April 1999 data, Table 6-1 was compiled. This table compares groundwater analytical parameters (hexavalent and total chromium, cadmium, copper, purgeable aromatics and trichloroethene), and groundwater elevations at shallow well locations which were sampled during April 1999. Laboratory analytical reports from all wells sampled during the April 1999 sampling round are located in Appendix B.

Consistent with the results of laboratory testing performed on the groundwater samples collected since January 1989 from the on-site monitoring wells, three contaminant plumes in the Hollydale Aquifer were identified. Historically, these plumes have been present at varying concentrations and lateral extent. One small plume, consisting primarily of site-specific metals parameters, has been aligned in a northeasterly to southwesterly direction in the vicinity of wells MW-04 and MW-14S. The second, consisting of purgeable aromatics, has also been aligned in a northeasterly to southwesterly direction with the highest concentrations generally found in wells MW-04 and MW-09. The third plume consists of trichloroethene and related parameters with highest concentrations generally detected in wells MW-04, MW-09, MW-11, and MW-14S.

6.1 Purgeable Halogenated Organic Compounds

Table 6-2 shows the analytical results for purgeable halogenated organic compounds in deep and shallow wells during April 1999. Trichloroethene was the primary compound detected, with miscellaneous other halogenated organics also detected. The table also shows, for comparison purposes, maximum contaminant limits (MCLs) and concentrations for water supply wells in the Santa Fe Springs area. The supply wells, however, are likely screened much deeper than the wells at PTI. The City of Santa Fe Springs Annual Water Quality Report for 1996 (the most recent report available) is contained in Appendix D of this document.

Trichloroethene

Trichloroethene (TCE) was detected in all 14 of the groundwater monitoring wells sampled during April 1999. The highest concentration of TCE detected in April 1999 was 480 µg/L in well MW-11, a decrease from the result of 690 µg/L in January 1999. The second highest concentration of TCE detected was 350 µg/L in well MW-9, a decrease from the result of 550 µg/L in January 1999. The third highest concentration of TCE detected was 190 µg/L in well MW-04, a decrease from the result of 260 µg/L in January 1999.

Detected concentrations of TCE in the majority of the remaining shallow wells decreased slightly in April 1999 from the results in January 1999, and ranged in concentration from 4.2 µg/L in MW-15S to 84 µg/L in MW-14S. Deep well detections increased in three of the four wells, and ranged from 2.1 µg/L in MW-01D to 25 µg/L in MW-15D. Well MW-04A decreased from 10 µg/L in January 1999 to 7.0 µg/L in April 1999. Concentrations for TCE detected in shallow and deep wells are shown in Figures 6-1 and 6-2, respectively.

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 1S																		
Jan-89	96.74	N D	0.01		0.014	N D	0.003	N D	0.009	N D	0.01	N D	0.0	N D	0.0	N D	0.0	19
Apr-89	100.45	N D	0.05		0.1	N D	0.01	N D	0.02	N D	0.7	N D	1.0	N D	1.0		3.0	23
Jul-89	99.00	N D	0.05		0.06		0.01		0.03	N D	0.7	N D	1.0	N D	1.0	N D	1.0	13
Oct-89	96.76	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	0.5	N D	1.0	N D	1.0	N D	1.0	12
Jan-90	97.73	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1.0	16
Apr-90	99.30	N D	0.02		0.02	N D	0.005		0.02	N D	2.5	N D	2.5	N D	2.5	N D	5.0	20
Jul-90	100.83	N D	0.02	N D	0.01	N D	0.01		0.03	N D	0.5	N D	0.5	N D	0.5	N D	1.0	18
Oct-90	99.81	N D	0.02	N D	0.01	N D	0.005		0.023	N D	0.5	N D	1.0	N D	1.0	N D	1.0	18
Jan-91	99.19	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	26
Apr-91	101.95	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	22
Jul-91	102.94	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	17
Oct-91	102.33	N D	0.02		0.01	N D	0.005		0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	14
Jan-92	104.60		0.10	N D	0.0081	N D	0.0027		0.04	N D	1		1.5		1.2		4.3	13
Apr-92	107.28	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	0.5	9.9
Jul-92	107.87	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	10
Oct-92	105.53	N D	0.02	N D	0.01	N D	0.005		0.035		0.95	N D	1.0	N D	1.0	N D	1.0	11
Jan-93	109.82	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.2		1.3		5.6	9.2
Apr-93	116.01	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	5.7
Jul-93	116.59	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.7		1.7		4.0	11
Oct-93	116.50	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.2		4.3	14
Jan-94	116.60	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	9.3
Apr-94	117.10	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	14
Jul-94	117.80	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	7.9
Oct-94	112.23	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0		5.8	13
Jan-95	113.59	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	5.2
Apr-95	118.78	N D	0.02		0.0029	N D	0.001	N D	0.02	N D	0.5	N D	1.0		1.3		1.0	4.4
Jul-95	120.06	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.2		3.5		6.1	6.2
Oct-95	116.48	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.7		3.9	15
Jan-96	114.84	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.7		5.1	8.4
Apr-96	118.03	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		3.4		4.9	2.9
Jul-96	117.42	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.2		3.7	9.7
Oct-96	113.85	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.1		2.8	16
Jan-97	115.73	N D	0.02	N D	0.01	N D	0.005		0.022	N D	0.5	N D	1.0	N D	1.0		2.0	6.0
Apr-97	118.21	N D	0.02	N D	0.01	N D	0.005	ND	0.020	N D	0.5	N D	1.0		1.4		1.2	15
Jul-97	118.18	N D	0.02	N D	0.01	N D	0.005	ND	0.020	N D	0.5	N D	1.0	N D	1.0	N D	1.0	14
Oct-97	114.82	N D	0.02	N D	0.01	N D	0.005		0.023	N D	0.5	N D	1.0	N D	1.0	N D	1.0	12
Jan-98	113.23	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	12
Apr-98	118.16	N D	0.02	N D	0.01	N D	0.005		0.021	N D	0.5	N D	1.0	N D	1.0	N D	1.0	14
Jul-98	119.12	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	14
Oct-98	116.57	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	7.8
Jan-99	113.94	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.0	N D	1.0	10
Apr-99	114.01	N D	0.025	N D	0.01	N D	0.005	N D	0.025	N D	1.0	N D	1.0	N D	1.0	N D	2.0	7.2

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 3																		
Jan-89	95.02	N D	0.01	N D	0.014	N D	0.003	N D	0.009		7.4		17.0		4900.0		1500.0	74
Apr-89	99.29	N D	0.05		0.07	N D	0.01	N D	0.02	N D	50	N D	50.0		1200.0		60.0	110
Jul-89	98.21	N D	0.05		0.06	N D	0.01	N D	0.02	N D	7	N D	10.0	N D	10.0	N D	10.0	120
Oct-89	94.75	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	50	N D	100.0		1600.0		150.0	N D 100
Jan-90	95.98	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	5	N D	5.0		110.0	N D	10.0	65
Apr-90	97.72	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	50	N D	50.0		2100.0		720.0	74
Jul-90	99.27	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	5	N D	5.0	N D	5.0	N D	10.0	130
Oct-90	97.29	N D	0.02	N D	0.01	N D	0.005	N D	0.02		9		2.0	N D	1.0	N D	1.0	130
Jan-91	97.69	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	38
Apr-91	99.81	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	27
Jul-91	101.63	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	28
Oct-91	100.99	N D	0.02	N D	0.01	N D	0.005		0.03	N D	0.5	N D	1.0	N D	1.0	N D	1.0	71
Jan-92	103.44	N D	0.05	N D	0.0081	N D	0.0027		0.02	N D	1	N D	1.0	N D	1.0		4.0	76
Apr-92	106.04	N D	0.02	N D	0.02	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	0.5	25
Jul-92	106.61	N D	0.02		0.02	N D	0.005		0.13	N D	0.5	N D	1.0	N D	1.0	N D	1.0	76
Oct-92	103.93	N D	0.02	N D	0.02	N D	0.005		0.038		0.52	N D	1.0	N D	1.0	N D	1.0	130
Jan-93	107.28	N D	0.02	N D	0.01	N D	0.005		0.096	N D	2.5	N D	5.0	N D	5.0	N D	5.0	84
Apr-93	115.17	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	12
Jul-93	115.92	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		3.3		2.6		5.9	16
Oct-93	115.67	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.6		4.8	17
Jan-94	115.59	N D	).02/0.4**	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	10
Apr-94	116.33	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	15
Jul-94	116.91	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	26
Oct-94	110.85	N D	0.02	N D	0.01	N D	0.005	N D	0.02		1.2		3.5		1.5		12.0	76
Jan-95	111.83	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	72
Apr-95	117.83	N D	0.02		0.0023	N D	0.001	N D	0.02	N D	0.5	N D	1.0		1.3	N D	1.0	57
Jul-95	119.20	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.0		5.2		8.8	9.5
Oct-95	115.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.7		3.3	30
Jan-96	113.41	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0		5.1	26
Apr-96	116.73	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.6		3.6	46
Jul-96	116.33	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.8		9.0		12.0	17
Oct-96	112.45	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		5.4		6.2	21
Jan-97	114.19	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.6		1.1		4.2	28
Apr-97	117.13	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		4.3		2.1		3.0	13
Jul-97	117.18	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1.0		2.5		3.7	13
Oct-97	113.60	N D	0.02	N D	0.01	N D	0.005	N D	0.02		0.57	ND	1.0		1.7		1.2	24
Jan-98	111.68	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.3	N D	1.0	25
Apr-98	116.82	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	18
Jul-98	118.02	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	25
Oct-98	115.40	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	24
Jan-99	112.48	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.3	N D	1.0	26
Apr-99	112.49	N D	0.025	N D	0.01	N D	0.005	N D	0.025	N D	1.0	N D	1.0		1.1	N D	2.0	21

** Hexavalent chromium sample or result for MW03 likely switched with MW30 (dup. of MW04). Laboratory reported MW03 r
MW30 result of ND at a detection limit of 0.02 mg/L.

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS						PURGEABLE AROMATICS								HALOCARBONS	
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)	
MW - 4																	
Jan-89	95.21	33.0	400.0	0.028	N D	0.009		N D	0.5	10.0		15.0		29.0		120	
Apr-89	99.19	43.0	100.0	0.05		0.02		N D	5	23.0		15.0		50.0		280	
Jul-89	98.19	120.0	98.0	0.08		0.06		N D	14	N D	20.0	140.0		40.0		290	
Oct-89	94.92	110.0	120.0	0.07	N D	0.05		N D	0.5	N D	1.0	N D	1.0	N D	1.0	250	
Jan-90	95.87	109.0	95.1	0.12	N D	0.02		N D	12	N D	12.0	N D	12.0	N D	25.0	220	
Apr-90	97.50	81.7	80.7	0.13		0.02		N D	10	N D	10.0	N D	10.0	N D	20.0	280	
Jul-90	99.20	100.0	101.0	0.35	N D	0.02		N D	50	N D	50.0	1600.0		170.0		320	
Oct-90	98.33	58.9	48.4	0.23		0.022		N D	0.5	17.0		230.0		650.0		250	
Jan-91	97.68	49.4	65.3	0.26	N D	0.02		N D	0.5	N D	1.0	N D	1.0	1200.0		180	
Apr-91	100.50	23.8	18.4	0.076	N D	0.02		N D	0.5	N D	1.0	730.0		N D	1.0	170	
Jul-91	101.47	39.1	78.5	0.61	N D	0.02		N D	0.5	16000.0		6700.0		18000		190	
Oct-91	100.91	42.0	40.8	0.21	N D	0.01		N D	0.5	6900.0		4100.0		10000	N D	400	
Jan-92	103.33	41.0	34.0	0.47		0.045		N D	250	18,000		10,000		17,200	N D	250	
Apr-92	105.94	32.2	29.2	0.84		0.053			6.7	7.2		960.0		1010.0		280	
Jul-92	106.5	79.9	59.7	0.86	N D	0.02		N D	5	N D	10.0	200.0		280.0		280	
Oct-92	103.92	21.6	27.1	0.32	N D	0.02			71	N D	10.0	1300.0		230.0		230	
Jan-93	107.13	16.4	27.4	0.28	N D	0.02		N D	130	10000.0		10000		19000	N D	250	
Apr-93	115	1.8	2.2	N D	0.005	N D	0.02	N D	0.5	N D	1.0	88.0		13.0		25	
Jul-93	115.52	21.0	23.2	0.2		0.056			0.6	2.0		1.8		11.0		100	
Oct-93	115.76	* 35.5/99.2	80.3	0.71	N D	0.2			1.3	N D	1.0	N D	1.0	40.0		290	
Jan-94	115.42	0.36	36.0	0.23	N D	0.02			0.81	N D	1.0	8.3		14.0		130	
Apr-94	116.20	26.9	26.4	0.33	N D	0.02		N D	0.5	N D	1.0	4.0		6.5		190	
Jul-94	116.76	59.0	41.4	0.20		0.038			0.58	N D	1.0	N D	1.0	4.2		340	
Oct-94	110.86	60.7	52.8	0.45	N D	0.02		N D	5	N D	10.0	270.0		39.0		390	
Jan-95	111.88	28.8	34.3	0.13		0.026		N D	5	N D	10.0	350.0		130.0		190	
Apr-95	117.69	8.6	9.1	0.21		0.052		N D	100	1600.0		1700.0		2900.0		67	
Jul-95	119.05	* 28.1/20.8	29.6	0.27	*.10/ND<.02			N D	10	* 270/410		* 260/380		* 890/1300		90	
Oct-95	115.35	**30.8	28.9	0.38	N D	0.02		N D	2.5	N D	5.0	75.0		21.0		150	
Jan-96	113.37	25.7	32.4	0.19	N D	0.02		N D	50	100.0		2100.0		1400.0		160	
Apr-96	116.65	* 32.2/24.6	38.0	0.60	N D	0.02		N D	25	680.0		1300.0		1400.0		130	
Jul-96	116.17	50	58.9	0.28	N D	0.02		N D	50	ND	100.0	1000.0		270.0		140	
Oct-96	112.38	63.8	75.7	0.46	N D	0.04		N D	50	380.0		1100.0		1900.0		310	
Jan-97	114.07	*45.9/34.9	34.5	0.54		0.02		N D	6.2	ND	12.0	1100.0		ND	12.0	330	
Apr-97	116.96	27.3	18.8	0.53	N D	0.02		N D	12	35.0		1300.0		620.0		150	
Jul-97	117.04	36.0	35.2	0.62	N D	0.02		ND	5	ND	10.0	810.0		110.0		150	
Oct-97	113.46	73.8	85.3	0.64	ND	0.08		ND	5	ND	10.0	460.0		31.0		230	
Jan-98	111.66	39.2	44.0	0.53	ND	0.02		ND	5	ND	10.0	530.0		420.0		180	
Apr-98	116.69	7.2	14.1	0.43	ND	0.02			2.9	ND	5.0	320.0		ND	5.0	92	
Jul-98	117.95	16.3	18.9	0.32	ND	0.02		ND	12	ND	25.0	1200.0		300.0		120	
Oct-98	115.31	34.1	36.2	0.44		0.030		ND	6.2	ND	12.0	740.0		240.0		120	
Jan-99	112.41	78.6	85.2	0.58	ND	0.040		ND	5.0	ND	10	520.0		31.0		260	
Apr-99	112.43	*0.57/4.6	42.8	0.41	ND	0.050			3.5	ND	2.5	220		9.9		190	

* 35.5/99.2 = original sample/duplicate sample (both results presented because duplicate result deviation is >20%)

** Analyzed after holding time had expired.

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 6B																		
Jan-89	95.12	N D	0.01	N D	0.014	N D	0.003	N D	0.009	N D	0.01	N D	0.0	N D	0.0	N D	0.0	57
Apr-89	99.11	N D	0.05		0.06	N D	0.01	N D	0.02	N D	0.7	N D	1.0	N D	1.0	N D	1.0	37
Jul-89	98.39	N D	0.05		0.04	N D	0.01	N D	0.02	N D	0.7	N D	1.0	N D	1.0	N D	1.0	29
Oct-89	95.35	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	0.5	N D	1.0	N D	1.0	N D	1.0	29
Jan-90	96.1	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1.0	46
Apr-90	97.76	N D	0.02		0.02	N D	0.005	N D	0.02	N D	2.5	N D	2.5	N D	2.5	N D	5.0	61
Jul-90	99.28	N D	0.02		0.02	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1.0	51
Oct-90	98.45	N D	0.02		0.012	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	52
Jan-91	97.87	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	59
Apr-92	105.86	N D	0.02		0.014	N D	0.005	N D	0.02	N D	0.5	N D	0.5		1.1		0.8	19
Jul-92	106.57	N D	0.02		0.019	N D	0.005		0.054	N D	0.5	N D	0.5	N D	1.0	N D	1.0	10
Oct-92	104.12	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		12.0		2.9		13.0	9.3
Jan-93	107.23	N D	0.02		0.011	N D	0.005		0.038	N D	0.5	N D	1.0	N D	1.0	N D	1.0	6.9
Apr-93	114.64	N D	0.02		0.014	N D	0.005	N D	0.02	N D	0.5		64.0		26.0		88.0	2.6
Jul-93	115.34	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.2		2.0		5.5	2.7
Oct-93	115.46	N D	0.02		0.011	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	5.9
Jan-94	115.37	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	2.7
Apr-94	116.15	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	2.0
Jul-94	116.67	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1	N D	1.0		1.9	2.9
Oct-94	111.13	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.5	N D	1.0		8.2	1.5
Jan-95	112.19	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		110.0		89.0		110.0	8.6
Apr-95	117.42	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.6		9.1		6.2	2.3
Jul-95	118.93	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1		4.0		5.1	8.8
Oct-95	115.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0		1.0	2.6
Jan-96	113.47	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		28.0		27.0		53.0	14
Apr-96	116.65	N D	0.02		0.011	N D	0.005	N D	0.02	N D	1		4.2		37.0		50.0	2.9
Jul-96	116.18	N D	0.01	ND	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1.0		2.3		3.5	2.3
Oct-96	112.66	N D	0.01	ND	0.01	N D	0.005	N D	0.02	N D	0.5		1.0		2.1		2.8	6.1
Jan-97	114.20	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		4.3		4.3		6.4	5.0
Apr-97	116.95	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		3.6		1.7	N D	1.0	5.2
Jul-97	117.01	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	6.6
Oct-97	113.71	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	6.4
Jan-98	112.06	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		15.0		32.0		39.0	17.0
Apr-98	116.76	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		1.6		4.2		6.0	7.7
Jul-98	117.95	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	4.3
Oct-98	114.83	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	ND	1.0	N D	1.0	9.9
Jan-99	112.74	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		5.0		24.0		29.0	17.0
Apr-99	112.56	N D	0.01	ND	0.01	N D	0.005	N D	0.025	N D	1.0		19		42		33.9	31

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 7																		
Jan-89	89.47	N D	0.01	N D	0.014	N D	0.003	N D	0.009	N D	0.5		1.4		1.2		3.6	35
Apr-89	98.83	N D	0.05		0.02	N D	0.01	N D	0.02	N D	0.7	N D	1.0	N D	1.0	N D	1.0	47
Jul-89	97.90	N D	0.05		0.03	N D	0.01	N D	0.05	N D	0.7	N D	1.0	N D	1.0	N D	1.0	25
Oct-89	94.72	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	0.5	N D	1.0	N D	1.0	N D	1.0	44
Jan-90	95.58	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	2.5	N D	2.5	N D	2.5	N D	5.0	39
Apr-90	97.32	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5	N D	2.5	N D	2.5	N D	5.0	46
Jul-90	98.85	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	1	N D	1.0	N D	1.0	N D	2.0	34
Oct-90	98.02	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	19
Jan-91	97.41	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	1.8
Apr-91	100.06	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	30
Jul-91	101.20	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	53
Oct-91	100.62	N D	0.02	N D	0.01	N D	0.005		0.01	N D	0.5	N D	1.0	N D	1.0	N D	1.0	54
Jan-92	102.90		0.07	N D	0.0081	N D	0.0027		0.14	N D	1	N D	1.0	N D	1.0	N D	1.0	120
Apr-92	105.54	N D	0.02		0.013	N D	0.005		0.032	N D	0.5	N D	1.0	N D	1.0	N D	1.0	55
Jul-92	103.13	N D	0.02		0.095	N D	0.005		0.21	N D	1	N D	2.0	N D	2.0	N D	2.0	53
Oct-92	103.68	N D	0.02		0.063	N D	0.005		0.65	N D	0.5	N D	1.0	N D	1.0	N D	1.0	98
Jan-93	106.82	N D	0.02		0.033	N D	0.005		0.19	N D	0.5	N D	1.0	N D	1.0	N D	1.0	73
Apr-93	114.54	N D	0.02		0.011	N D	0.005	N D	0.02	N D	1.2	N D	2.5		90.0		5.6	23
Jul-93	115.14	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	5	N D	10.0		210.0	N D	10.0	43
Oct-93	115.23	N D	0.2	N D	0.01	N D	0.005		0.02		0.82	N D	1.0		7.2	N D	1.0	44
Jan-94	115.08	N D	0.02	N D	0.01	N D	0.005	N D	0.02		1.4	N D	1.0		33.0	N D	1.0	53
Apr-94	115.88	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5	N D	5.0		200.0	N D	5.0	96
Jul-94	116.44	N D	0.02	N D	0.01	N D	0.005		0.023		0.88	N D	1.0		7.7		1.2	140
Oct-94	110.69	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		5.1		5.5	98
Jan-95	111.59	N D	0.02	N D	0.01	N D	0.005		0.026	N D	0.5		7.0		8.7		10.0	170
Apr-95	117.24	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.3	N D	1.0	26
Jul-95	118.63	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.1		3.4	53
Oct-95	115.08	N D	0.02		0.014	N D	0.005		0.079		0.74	N D	1.0		3.8		1.4	98
Jan-96	112.98	N D	0.02	N D	0.01	N D	0.005		0.043		1.0		4.2		4.9		10.0	85
Apr-96	116.39	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.3		11.0		14.0	37
Jul-96	115.83	N D	0.01	N D	0.01	N D	0.005	N D	0.02		1.0	N D	1.0		1.6		2.7	87
Oct-96	112.17	N D	0.01	N D	0.01	N D	0.005		0.036		0.96	N D	1.0		1.4		1.5	150
Jan-97	113.76	N D	0.02	N D	0.01	N D	0.005		0.029	N D	0.5	N D	1.0		1.7		2.8	95
Apr-97	116.62	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1		1.2	N D	1.0	63
Jul-97	116.74	N D	0.02	N D	0.01	N D	0.005	N D	0.02		0.56	ND	1.0	ND	1.0	ND	1.0	54
Oct-97	111.27	N D	0.02	N D	0.01	N D	0.005		0.025	N D	0.5	ND	1.0	ND	1.0	ND	1.0	85
Jan-98	111.47	N D	0.02		0.01	N D	0.005		0.044	N D	0.5		2.2		5.2		6.8	97
Apr-98	116.38	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.6		1.8	23
Jul-98	117.62	N D	0.02	N D	0.01	N D	0.005	ND	0.02	N D	0.5	ND	1.0	ND	1.0	ND	1.0	53
Oct-98	115.06	N D	0.02	N D	0.01	N D	0.005		0.042		0.68	ND	1.0	ND	1.0	ND	1.0	88
Jan-99	112.28	N D	0.02	N D	0.01		0.0056		0.05	ND	1.2	ND	2.5	ND	2.5	ND	2.5	160
Apr-99	112.11	N D	0.01	N D	0.01	N D	0.005		0.042	ND	2.0		3.0		11		6.8	80

TABLE 6-1
PHIBRO-TECH, INC.
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Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW-9																		
Jan-89	95.55		0.45		0.33	ND	0.003	ND	0.009	ND	0.5	ND	0.5	ND	0.5	ND	1.0	55
Apr-89	99.67	ND	0.02		0.06	ND	0.01	ND	0.02	ND	0.7	ND	1.0	ND	1.0	ND	1.0	24
Jul-89	98.77	ND	0.05		0.17	ND	0.01		0.02	ND	0.7	ND	1.0	ND	1.0	ND	1.0	57
Oct-89	95.62		2.5		1.8	ND	0.01	ND	0.05	ND	0.5	ND	1.0	ND	1.0	ND	1.0	110
Jan-90	96.44		2.28		2.2	ND	0.01	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5.0	100
Apr-90	98.26		0.8		0.81	ND	0.005	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5.0	150
Jul-90	99.78		0.03		0.04	ND	0.01	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5.0	64
Oct-90	98.69		0.25		0.19	ND	0.005		0.062	ND	0.5	ND	1.0	ND	1.0	ND	1.0	17
Jan-91	98.04		0.124		0.085	ND	0.005	ND	0.02	ND	0.5		6.6		1.4		9.0	26
Apr-91	100.83	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1.0	ND	1.0	ND	1.0	26
Jul-91	101.88	ND	0.02		0.027	ND	0.005	ND	0.02	ND	0.5	ND	1.0		99.0	ND	1.0	41
Oct-91	101.30		0.05		0.07	ND	0.005	ND	0.01	ND	0.5	ND	1.0		94.0	ND	1.0	120
Jan-92	103.62	ND	0.05	ND	0.0081	ND	0.0027		0.031	ND	1	ND	1.0		1220.0		92.0	45
Apr-92	106.27	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.05		2800.0		3600.0		6190.0	52
Jul-92	106.93	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.05		34000.0		7900.0		24000	ND 1000
Oct-92	104.3	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	1000		83000.0		13000		58000	ND 1000
Jan-93	107.56	ND	0.02		0.057	ND	0.005		0.053	ND	50		400.0		3900.0		5300.0	ND 100
Apr-93	115.26	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50		5100.0		4000.0		9200.0	110
Jul-93	115.81	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	16	ND	33.0		160.0		74.0	1100
Oct-93	115.79	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5.0		120.0		45.0	390
Jan-94	115.76	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	10		48.0		290.0		220.0	230
Apr-94	116.51	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	500		17000.0		12000		32000	270
Jul-94	117.03	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	1000		56000.0		15000		40000	200
Oct-94	111.17	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	500		57000.0		11000		34000	350
Jan-95	112.25	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	250		8200.0		9800.0		2000.0	310
Apr-95	117.92	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50	ND	100.0		650.0		480.0	670
Jul-95	119.31	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	10		69.0		780.0		340.0	540
Oct-95	115.67	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	25		110.0		670.0		1900.0	320
Jan-96	113.73	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50		100.0		4300.0		6100.0	500
Apr-96	117.00	ND	0.02	ND	0.01	ND	0.005	ND	0.02		3.3		5.5		24.0		22.0	580
Jul-96	116.49	ND	0.01	ND	0.01	ND	0.005	ND	0.02		4.6	ND	2.0		42.0		4.3	570
Oct-96	112.73	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	50	ND	100.0		2900.0		350.0	470
Jan-97	114.46	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5.0	ND	5.0	ND	5.0	400
Apr-97	117.29	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	5	ND	10.0		18.0	ND	10.0	770
Jul-97	117.34	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	25	ND	50.0		2500.0		860.0	850
Oct-97	113.75	ND	0.02		0.048	ND	0.005	ND	0.02	ND	25		150.0		1900.0		4800.0	ND 50
Jan-98	112.06	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	5	ND	10.0		690.0		260.0	270
Apr-98	117.07	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	5	ND	10.0		23.0	ND	10.0	390
Jul-98	118.26	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	12	ND	25.0		73.0	ND	25.0	1300
Oct-98	115.49		3.3		1.3		0.0075		0.34		7.4	ND	12.0		390.0	ND	12.0	1200
Jan-99	112.68		3.3		2.4	ND	0.005	ND	0.02	ND	6.2	ND	12.0		100.0		83.0	550
Apr-99	112.77	ND	0.01		0.64	ND	0.005	ND	0.025	ND	5.0	ND	5.0	ND	5.0	ND	5.0	350

TABLE 6-1
PHIBRO-TECH, INC.
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Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 11																		
Jan-89	95.97	N D	0.01	N D	0.014	N D	0.003	N D	0.009	N D	0.5	N D	0.5	43.0		1.5		34
Apr-89	99.85	N D	0.02		0.04	N D	0.01	N D	0.02	N D	500		7500.0	2600.0		11000		39
Jul-89	98.95	N D	0.05	N D	0.02	N D	0.01		0.13	N D	7	N D	10.0	N D	10.0	90.0		29
Oct-89	95.77	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	5	N D	10.0	200.0		N D	10.0	35
Jan-90	96.72	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	5	N D	5.0	83.0		N D	10.0	46
Apr-90	98.44	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5		2.6	370.0		150.0		33
Jul-90	100.00	N D	0.02	N D	0.01	N D	0.01		0.03	N D	25		440.0	1000.0		760.0		65
Oct-90	98.97	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		15000.0	3000.0		10000	N D	1
Jan-91	98.29	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		15000.0	4700.0		12000	N D	1
Apr-91	101.17	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		8500.0	3300.0		7500.0		63
Jul-91	102.19	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		57.0	520.0		220.0		61
Oct-91	101.61	N D	0.02	N D	0.01	N D	0.005	N D	0.01	N D	0.5		140.0	2000.0		660.0		110
Jan-92	104.09		0.10	N D	0.0081	N D	0.0027		0.02	N D	1		7.3	230.0		26.0		85
Apr-92	106.61	N D	0.02	N D	0.01	N D	0.005	N D	0.01	N D	0.05		1.7	130.0		2.3		70
Jul-92	107.12	N D	0.02		0.02	N D	0.005		0.09	N D	0.05	N D	0.1	17.0		N D	0.1	160
Oct-92	104.55	N D	0.02		0.011	N D	0.005	N D	0.01	N D	0.05	N D	0.1	11.0		N D	0.1	160
Jan-93	108.27	N D	0.02		0.013	N D	0.005		0.088	N D	1.2	N D	2.5	110.0		N D	2.5	86
Apr-93	115.6	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.05	N D	1.0	2.0		N D	1.0	59
Jul-93	116.07	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.05		2.5	1.8		6.4		230
Oct-93	116.01	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	2.1		3.1		150
Jan-94	116.03	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	2.5		2.8		190
Apr-94	116.83	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	80
Jul-94	117.23	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	1.6		180
Oct-94	111.30	N D	0.02		0.011	N D	0.005	N D	0.02	N D	0.5	N D	1.0	4.5		N D	1.0	360
Jan-95	112.53	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	10		660.0	850.0		1100.0		660
Apr-95	118.26	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	50	N D	100.0	1900.0		1000.0		74
Jul-95	119.51	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5	N D	5.0	160.0		37.0		140
Oct-95	115.80	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	5.8		2.2		180
Jan-96	113.98	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	25		520.0	460.0		1000.0		620
Apr-96	117.37	N D	0.02	N D	0.01	N D	0.005		0.023	N D	25		160.0	1100.0		1400.0		240
Jul-96	116.75	N D	0.01	N D	0.01	N D	0.005	ND	0.02	N D	10	ND	20.0	460.0		290.0		220
Oct-96	112.95	N D	0.01	N D	0.01	N D	0.005	ND	0.02	N D	0.5		1.9	20.0		8.0		250
Jan-97	114.78	N D	0.02	N D	0.01	N D	0.005		0.029	N D	0.5		9.4	84.0		88.0		160
Apr-97	117.60	N D	0.02	N D	0.01	N D	0.005	ND	0.02	N D	2.5	ND	5.0	120.0		8.2		370
Jul-97	117.61	N D	0.02	N D	0.01	N D	0.005		0.15	N D	2.5	ND	5.0	8.3		ND	5.0	240
Oct-97	114.02	N D	0.02	N D	0.01	N D	0.005		0.1	N D	2.5	ND	5.0	ND	5.0	ND	5.0	350
Jan-98	112.23	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	12		770.0	1800.0		2200.0		390
Apr-98	117.36	N D	0.02	N D	0.01	N D	0.005		0.077	N D	1.2		63.0	150.0		210.0		180
Jul-98	118.57	N D	0.02	N D	0.01	N D	0.005		0.077	N D	1.2	ND	2.5	41.0		4.8		150
Oct-98	115.91	N D	0.02	N D	0.01	N D	0.005		0.041	N D	5	ND	10.0	ND	10.0	ND	10.0	430
Jan-99	113.05	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	6.2		260.0	750.0		970.0		690
Apr-99	113.14	N D	0.01	N D	0.01	N D	0.005	N D	0.025	N D	25		670	1600		1270		480

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 14S										
Oct-90	98.07	3.2	2.2	0.018	5.3	N D 0.5	N D 1.0	1750.0	N D 1.0	180
Jan-91	97.38	0.4	0.94	0.007	1	N D 0.5	N D 1.0	2800.0	5900.0	108
Apr-91	99.26	0.39	0.41	0.005	0.15	N D 0.5	N D 1.0	4100.0	N D 1.0	84
Jul-91	101.27	0.02	0.31	0.005	0.11	N D 0.5	N D 1.0	31.0	N D 1.0	55
Oct-91	100.66	0.13	0.23	N D 0.005	0.05	N D 0.5	N D 1.0	680.0	N D 1.0	81
Jan-92	103.08	0.27	0.15	N D 0.0027	0.093	N D 1	N D 1.0	N D 1.0	N D 1.0	59
Apr-92	105.70	0.13	0.16	N D 0.005	0.04	N D 0.5	N D 0.5	N D 0.5	N D 0.5	56
Jul-92	106.38	0.1	0.33	N D 0.005	0.56	0.6	N D 1.0	N D 1.0	N D 1.0	44
Oct-92	103.72	0.16	0.54	N D 0.005	0.72	N D 1	N D 1.0	N D 1.0	N D 1.0	71
Jan-93	107.00	0.056	0.24	N D 0.005	0.33	N D 0.5	N D 1.0	N D 1.0	N D 1.0	56
Apr-93	114.80	N D 0.02	0.018	N D 0.005	0.032	N D 0.5	24.0	40.0	55.0	18
Jul-93	115.36	N D 0.02	0.20	N D 0.005	0.023	N D 0.5	1.3	1.2	3.8	25
Oct-93	115.42	N D 0.02	0.01	N D 0.005	0.021	N D 0.5	ND 1.0	2.1	3.7	25
Jan-94	115.28	N D 0.02	0.015	N D 0.005	0.022	N D 0.5	ND 1.0	3.2	1.4	21
Apr-94	116.06	N D 0.02	0.022	N D 0.005	N D 0.020	N D 0.5	ND 1.0	ND 1.0	ND 1.0	29
Jul-94	116.64	N D 0.02	0.016	N D 0.005	N D 0.020	N D 0.5	ND 1.0	ND 1.0	ND 1.0	15
Oct-94	110.70	0.035	0.064	N D 0.005	N D 0.020	0.53	ND 1.0	ND 1.0	ND 1.0	58
Feb-95	113.10	N D 0.02	0.016	N D 0.005	0.020	N D 50	ND 100.0	3000.0	690.0	50
Apr-95	117.50	N D 0.02	N D 0.01	N D 0.005	N D 0.020	N D 5	76.0	120.0	190.0	20
Jul-95	118.93	N D 0.02	N D 0.01	0.0055	N D 0.020	N D 0.5	2.8	26.0	12.0	22
Oct-95	115.25	0.022	0.046	N D 0.005	N D 0.020	N D 0.5	ND 1.0	2.1	2.0	35
Jan-96	113.13	N D 0.02	0.034	N D 0.005	0.024	N D 1	4.7	87.0	58.0	42
Apr-96	116.52	0.021	0.028	N D 0.005	N D 0.020	N D 2.5	54.0	120.0	110.0	51
Jul-96	116.04	ND 0.01	0.069	N D 0.005	N D 0.020	0.58	ND 1.0	20.0	10.0	37
Oct-96	112.22	0.052	0.082	N D 0.005	N D 0.020	N D 0.5	ND 1.0	13.0	2.9	61
Jan-97	113.85	0.024	0.031	N D 0.005	N D 0.020	N D 2.5	ND 5.0	470.0	ND 5.0	90
Apr-97	116.82	N D 0.02	0.032	0.0053	N D 0.020	0.58	2.9	91.0	36.0	45
Jul-97	117.21	N D 0.02	0.016	ND 0.005	ND 0.020	ND 5	ND 1.0	14.0	1.0	35
Oct-97	113.39	0.1	0.013	ND 0.005	ND 0.020	ND 0.5	ND 1.0	20.0	1.8	57
Jan-98	111.43	* N D/0.0103	0.018	ND 0.005	0.020	ND 0.5	1.1	19.0	5.0	50
Apr-98	116.47	N D 0.02	0.018	ND 0.005	0.023	ND 12	ND 25.0	1500.0	150.0	38
Jul-98	117.79	N D 0.02	ND 0.01	ND 0.005	ND 0.020	0.51	ND 1.0	18.0	8.4	18
Oct-98	115.19	0.032	0.044	ND 0.005	0.027	ND 1.2	ND 2.5	120.0	29.0	62
Jan-99	112.31	0.058	0.032	ND 0.005	ND 0.020	1.1	ND 2.0	77.0	64.0	98
Apr-99	112.21	N D 0.01	ND 0.01	ND 0.005	ND 0.025	ND 12	ND 12	820	47	84

* ND/10.3 = EPA method 7196/EPA Method 218.6 (Sample was analyzed for hexavalent chromium by two methods.)

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 15S																		
Oct-90	97.71	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	21
Jan-91	97.10	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		4.0		1.6		4.0	13
Apr-91	99.71	N D	0.02	N D	0.01		0.011	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	28
Jul-91	100.94	N D	0.02	N D	0.01		0.014	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	17
Oct-91	100.35	N D	0.02		0.01		0.02		0.06	N D	0.5	N D	1.0	N D	1.0	N D	1.0	13
Jan-92	102.72	N D	0.051	N D	0.0081		0.008		0.01	N D	1	N D	1.0	N D	1.0	N D	1.0	15
Apr-92	105.29	N D	0.02	N D	0.01	N D	0.005	N D	0.01	N D	0.5	N D	0.5	N D	0.5	N D	0.5	4.1
Jul-92	105.95	N D	0.02		0.04		0.005		0.27	N D	0.5	N D	0.5	N D	0.5	N D	0.5	2.9
Oct-92	103.37	N D	0.02	N D	0.02		0.0073		0.047	N D	0.5	N D	0.5	N D	0.5	N D	0.5	N D 1
Jan-93	106.58	N D	0.02		0.014		0.0085		0.1	N D	0.5	N D	1.0	N D	1.0	N D	1.0	9.0
Apr-93	114.41	N D	0.02		0.013	N D	0.005	N D	0.02	N D	0.5		14.0		10.0		22.0	4.6
Jul-93	115.01	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.2	N D	1.0		2.4	2.4
Oct-93	115.07	N D	0.04	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	3.2
Jan-94	114.90	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	1.9
Apr-94	115.72	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	3.1
Jul-94	116.31	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	2.1
Oct-94	110.42	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	6.0
Jan-95	111.14		0.048		0.044	N D	0.005	N D	0.02	N D	1		4.0		64.0		27.0	3.7
Apr-95	117.15	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5		60.0		82.0		130.0	2.8
Jul-95	118.61	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.5		18.0		12.0	5.2
Oct-95	114.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.0	N D	1.0	3.9
Jan-96	112.69	N D	0.02		0.012	N D	0.005	N D	0.02	N D	0.5		1.8		25.0		22.0	3.8
Apr-96	116.09	N D	0.02		0.015	N D	0.005	N D	0.02	N D	0.5		13.0		40.0		45.0	2.8
Jul-96	115.69	N D	0.01		0.014	N D	0.005	N D	0.02	N D	0.5	N D	1.0		9.7		5.4	3.2
Oct-96	111.81	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		2.9		2.6	5.3
Jan-97	113.42	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5		5.5		69.0		1.0	5.1
Apr-97	116.35	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5		9.3		21.0		8.5	3.3
Jul-97	116.60	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5	ND	1.0		8.2		1.3	4.1
Oct-97	113.08	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5	ND	1.0		17.0		1.7	5.2
Jan-98	111.06	* N D/0.0177			0.021	N D	0.005	N D	0.02	N D	0.5	ND	1.0		12.0		3.7	5.0
Apr-98	116.05	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1.0		60.0		7.2	3.1
Jul-98	117.47	N D	0.02		0.014	N D	0.005	N D	0.02	ND	0.5	ND	1.0		10.0		2.9	3.4
Oct-98	114.87	ND	0.02		0.017	ND	0.005	ND	0.02	ND	0.5	ND	1.0		45.0		12.0	3.9
Jan-99	111.98		0.024	ND	0.01	N D	0.005	N D	0.02	ND	0.5	ND	1.0		19.0		2.2	7.0
Apr-99	111.85	N D	0.01		0.013	N D	0.005	N D	0.025	ND	1.0	ND	1.0		23		2.2	4.2

* ND/0.0177 = EPA method 7196/EPA Method 218.6 (Sample was analyzed for hexavalent chromium by two methods.)

TABLE 6-1
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 16																		
Apr-92	105.99	N D	0.02	N D	0.01	N D	0.005	N D	0.01	N D	0.5		0.7		1.0		1.6	52
Jul-92	106.7	N D	0.02		0.03	N D	0.02		0.35	N D	0.5	N D	1.0	N D	1.0	N D	1.0	35
Oct-92	104.07	N D	0.02		0.011	N D	0.005		0.15	N D	0.5	N D	1.0	N D	1.0	N D	1.0	72
Jan-93	107.3	N D	0.02	N D	0.01	N D	0.005		0.44	N D	1.2	N D	2.5	N D	2.5	N D	2.5	51
Apr-93	114.9	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	25		55.0		2300.0		1200.0	42
Jul-93	115.54	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	50	N D	100.0		3100.0		2000.0	15
Oct-93	115.51	N D	0.04	N D	0.01	N D	0.005	N D	0.02	N D	5.0	N D	10.0		340.0	N D	10.0	24
Jan-94	115.46	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.02	N D	20.0		1000.0	N D	20.0	22
Apr-94	116.25	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	10	N D	20.0		820.0	ND	20.0	37
Jul-94	116.78	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	25	N D	50.0		1300.0		730.0	76
Oct-94	111.02	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.5		2.4		9.7	91
Jan-95	112.08	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0	N D	1.0	N D	1.0	17
Apr-95	117.60	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	5		16.0		36.0		55.0	34
Jul-95	118.99	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	10	N D	20.0	* 540/370		N D	20.0	67
Oct-95	115.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		1.8		1.3	60
Jan-96	113.49	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		11.0		9.7	26
Apr-96	116.72	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		9.8		30.0		33.0	36
Jul-96	116.24	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1.0		6.6		3.6	110
Oct-96	112.59	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	5		49.0		130.0		230.0	73
Jan-97	114.18	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		4.6		23.0	ND	2.0	32
Apr-97	117.01	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1	N D	2.0		7.2		2.4	31
Jul-97	117.12	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1.2	ND	2.5		6.5	ND	2.5	30
Oct-97	113.66	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5	ND	5.0		8.2	ND	5.0	53
Jan-98	111.92	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1.0		12.0	ND	3.8	29
Apr-98	116.79	N D	0.02	N D	0.01	N D	0.005		0.023	N D	0.5	ND	1.0		28.0		2.7	29
Jul-98	118.00	N D	0.02	N D	0.01	N D	0.005		0.031	N D	0.5	ND	1.0		6.0		1.8	28
Oct-98	115.42	N D	0.02	N D	0.01	N D	0.005	N D	0.02	ND	2.5	ND	5.0		16.0	ND	5.0	58
Jan-99	112.68	N D	0.02	N D	0.01	N D	0.005	N D	0.02	ND	1.0	ND	2.0		11.0	ND	2.0	36
Apr-99	112.59	N D	0.01	N D	0.01	N D	0.005	N D	0.025	ND	2.0	ND	2.0		6.1	ND	2.0	39

ND = Below detection limit as noted

MSL = Mean Sea Level

* 540/370 = original sample/duplicate sample (both results presented because duplicate result deviation is >20%)

TABLE 6-2
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Purgeable Halogenated Organic Analytical Results
(µg/L)

Well Identification	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	1,1-Dichloro-ethene (1,1-DCE)	1,1-Dichloro-ethane (1,1-DCA)	1,2-Dichloro-ethane (1,2-DCA)	Carbon Tetrachloride (CCL4)	Chloroform (CHCL3)	cis-1,2-Dichloro-ethene (cis-1,2-DCE)	trans-1,2-Dichloro-ethene (trans-1,2-DCE)	1,1,1-Trichloro-ethane (1,1,1-TCA)	1,1,2-Trichloro-ethane (1,1,2-TCA)	Methylene Chloride (CH2CL2)
PTI- MW01S	1.8	7.2	1.0	ND<1.0	1.6	ND <1.0	ND <1.0	2.5	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW01D	ND <1.0	2.1	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW03	1.6	21	2.7	1.4	ND <1.0	38	24	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW04	ND <2.5	190	40	64	66	ND <2.5	10	68	ND <2.5	ND <2.5	ND <2.5	36
PTI- MW04A	1.5	7.0	ND <1.0	2.7	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW06B	1.6	31	1.5	2.3	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW06D	1.2	10	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW07	ND <2.0	80	8.4	33	9.7	ND <2.0	ND <2.0	22	2.7	ND <2.0	ND <2.0	ND <2.0
PTI- MW09	7.0	350	68	250	180	ND <5.0	160	16	ND <5.0	16	5.0	200
PTI- MW11	ND <25	480	29	70	28	ND <25	ND <25	ND <25	ND <25	ND <25	ND <25	ND <25
PTI- MW14S	ND<12	84	22	30	20	25	18	ND <12	ND <12	ND <12	ND <12	ND <12
PTI- MW15S	1.3	4.2	ND <1.0	ND <1.0	75	1.7	2.9	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW15D	13	25	2.3	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW16	ND <2.0	39	20	180	41	ND <2.0	ND <2.0	13	3.4	ND <2.0	ND <2.0	ND <2.0
MCL	5.0	5.0	6.0	5.0	0.5	0.5	—		10			—
SGV GW	ND-4.8	ND-1.2	ND	ND	ND	ND	—		ND			—

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area during the year 1996.

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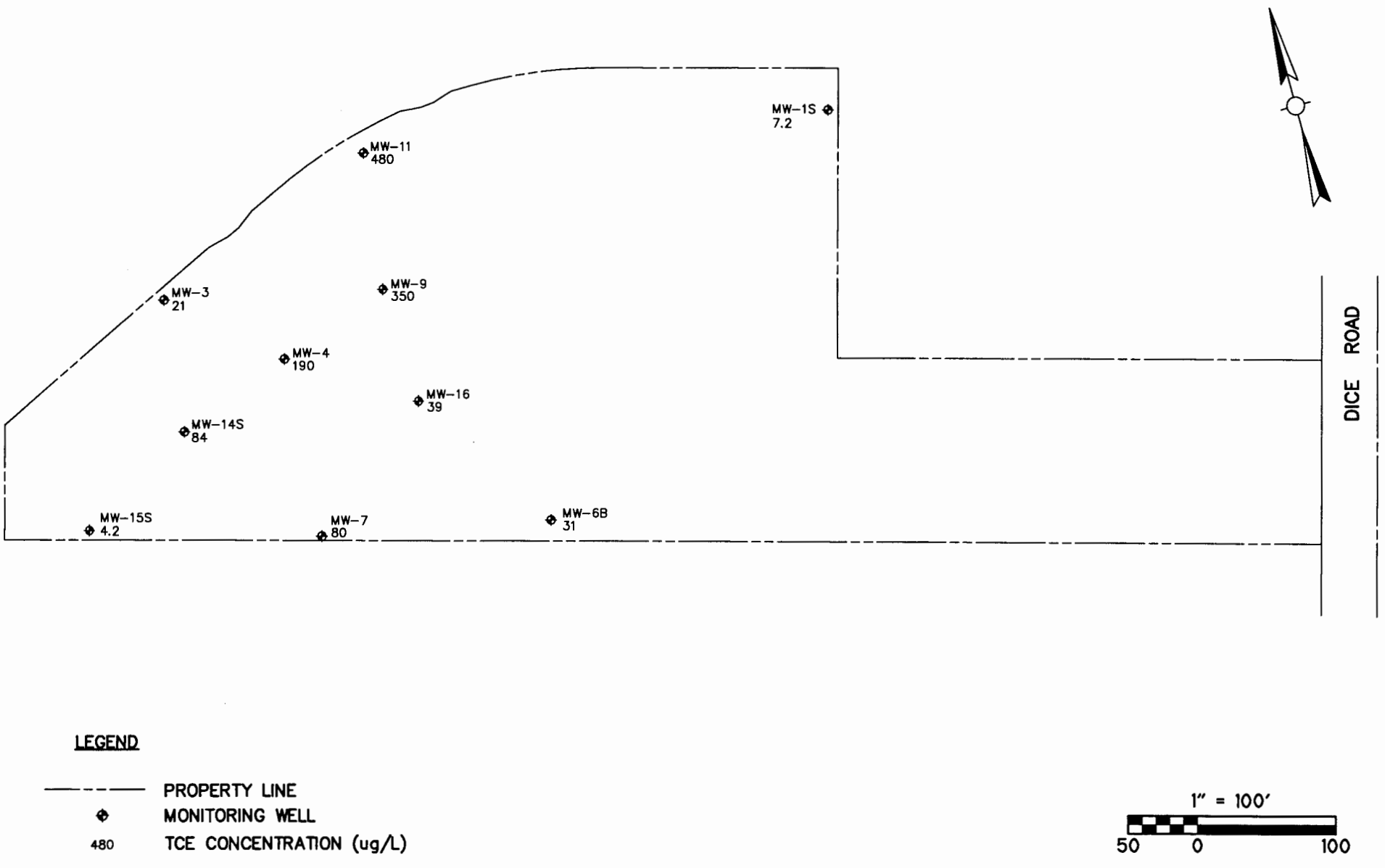

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TCE CONCENTRATIONS – SHALLOW WELLS APRIL 1999

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Figure 6-1

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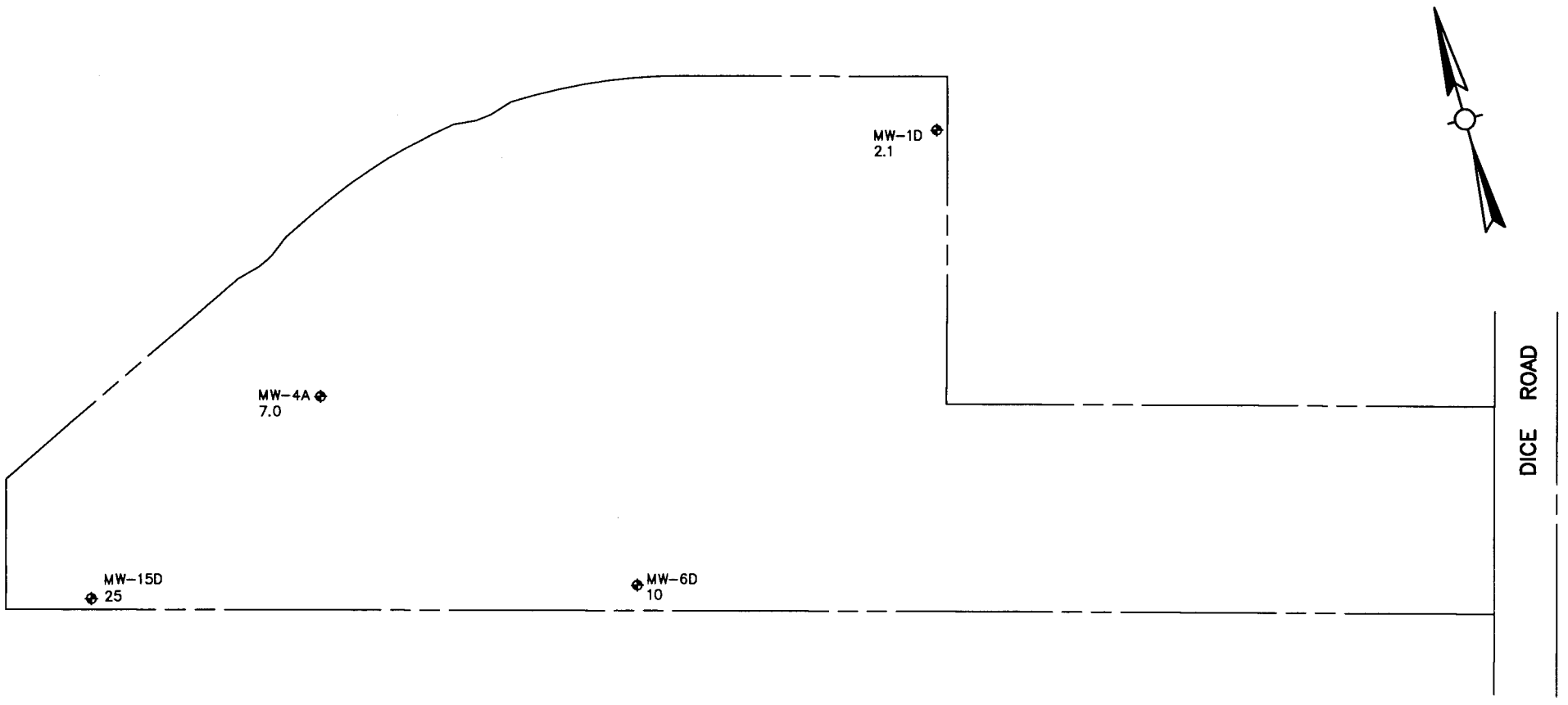

LEGEND

PROPERTY LINE

MONITORING WELL

25 TCE CONCENTRATION (ug/L)

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TCE CONCENTRATIONS – DEEP WELLS APRIL 1999

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Figure 6-2

A review of the analytical results contained in Table 6-1 reveals that, with minor exceptions, TCE has historically been detected in all on-site monitoring wells, including the upgradient wells. Past discussions with Department of Health Services (now Cal EPA Department of Toxic Substances Control) and Regional Water Quality Control Board staff indicate that TCE is generally recognized as a regional groundwater contaminant.

Other Halogenated Organics

During the April 1999 sampling, other purgeable halocarbon compounds were detected in most of the on-site wells at concentrations ranging from 1.0 µg/L 1,1-dichloroethene (MW-01S) to 250 µg/L 1,1-dichloroethane (MW-09). The compounds tetrachloroethene; chloroform; 1,2-dichloroethane; carbon tetrachloride; 1,1,1-trichloroethane; 1,1,2-trichloroethane; methylene chloride; and cis- and trans-1,2-dichloroethene were also detected in several wells. Detections of these other chlorinated organic compounds are assumed to be related to the TCE plume.

6.2 Purgeable Aromatic Organic Compounds

According to PTI personnel, organic chemicals have not historically been used on-site in any of the production processes. Two 10,000 gallon underground storage tanks (diesel and gasoline), however, were located in the approximate center of the facility, due east of the drum wash area. During tank removal operations in July 1989, petroleum hydrocarbon contamination was discovered in the tank excavation. The RFI report indicated that petroleum hydrocarbon contamination was not detected at depths below 30 feet near the former tank locations. Although they have not been used on-site, purgeable aromatic compounds have been historically detected in groundwater underlying the facility. The primary organic compounds of concern are toluene, ethylbenzene and total xylenes, which vary in both concentration and lateral extent. The RFI report indicated that these compounds appeared to be migrating onto the subject property from the property to the north. According to Los Angeles County Department of Public Works files, leaks from tanks containing purgeable aromatic compounds with subsequent groundwater contamination are known to have occurred at the property to the north of PTI.

Purgeable aromatic compound results for April 1999 are presented in Table 6-3. Concentrations of total aromatic compounds for the shallow wells are illustrated on Figure 6-3. Historic sampling results indicate that purgeable aromatic contamination originated off-site to the north and has migrated onto the subject property. During previous sampling events, elevated concentrations of toluene, ethylbenzene and xylenes were detected in MW-11 and MW-3 along the northern perimeter of the property. Since approximately July 1991, elevated concentrations of these compounds have been detected in well MW-04, indicating that the plume may be migrating down gradient. In addition, since January 1992 high concentrations have also been detected in well MW-09. The results of the April 1999 sampling show that the highest concentrations of total purgeable aromatics (BTEX) were detected in MW-11 (Figure 6-3), which had an ethylbenzene concentration of 1600 µg/L and a total xylenes concentration of 1270 µg/L. The second highest total BTEX concentration was detected in well MW-14S, which had a ethylbenzene concentration of 820 µg/L and total xylenes of 47 µg/L.

TABLE 6-3
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Purgeable Aromatic Organic Analytical Results
(µg/L)

Well Identification	Benzene	Toluene	Ethylbenzene	Xylenes (Total)
PTI- MW01S	ND <1.0	ND <1.0	ND <1.0	ND <2.0
PTI- MW01D	ND <1.0	ND <1.0	**1.6**	ND <2.0
PTI- MW03	ND <1.0	ND <1.0	**1.1**	ND <2.0
PTI- MW04	**3.5**	ND< 2.5	**220**	**9.9**
PTI- MW04A	ND <1.0	ND <1.0	**2.9**	**1.7**
PTI- MW06B	ND <1.0	**19**	**42**	**33.9**
PTI- MW06D	ND <1.0	**4.0**	**14**	**11.5**
PTI- MW07	ND <2.0	**3.0**	**11**	**6.8**
PTI- MW09	ND <5.0	ND <5.0	ND <5.0	ND <5.0
PTI- MW11	ND <25	**670**	**1600**	**1270**
PTI- MW14S	ND <12	ND <12	**820**	**47**
PTI- MW15S	ND <1.0	ND <1.0	**23**	**2.2**
PTI- MW15D	ND <1.0	ND <1.0	**12**	**1.6**
PTI- MW16	ND <2.0	ND <2.0	**6.1**	ND <2.0
MCL	**1.0**	**150**	**700**	**1,750**
SGV GW	ND	ND	ND	ND

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area during the year 1996.

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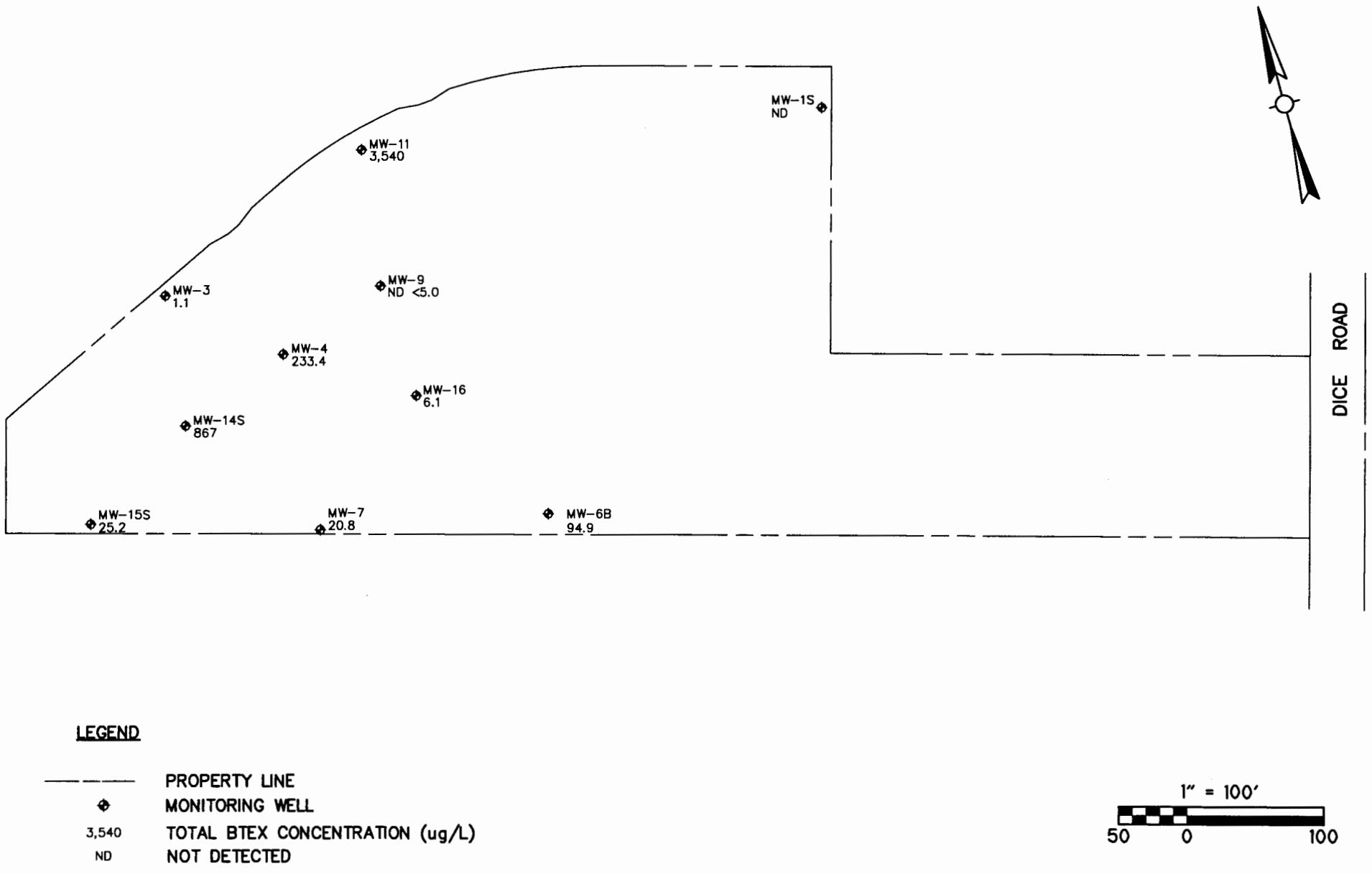

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TOTAL BTEX CONCENTRATIONS – SHALLOW WELLS APRIL 1999

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Figure 6-3

Benzene

During the April 1999 sampling, benzene was detected in only one well (MW-04) at a concentration of 3.5 µg/L. During the January 1999 sampling event, benzene was detected in only one well (MW-14S) at a concentration of 1.1 µg/L. Historical evidence indicates that benzene is not a contaminant of concern for the facility.

Toluene

During the April 1999 sampling event, toluene was detected in four wells (MW-06B, MW-06D, MW-07, and MW-11) at a concentrations of 19 µg/L, 4.0 µg/L, 3.0 µg/L, and 670 µg/L, respectively. During the January 1999 sampling event, toluene was detected in three wells (MW-06B, MW-06D, and MW-11) at a concentrations of 5.0 µg/L, 1.2 µg/L, and 260 µg/L, respectively. Significant toluene concentrations were detected during July 1990 to July 1991 (MW-11), April 1991 to January 1992 (MW-04), April 1992 to April 1993 (MW-09), and April 1994 to January 1995 (MW-09). Concentrations were also detected at location MW-04 during January 1993. Elevated ethylbenzene and total xylene concentrations are generally associated with elevated toluene concentrations.

Ethylbenzene

During the April 1999 sampling round, ethylbenzene was detected in 12 of the 14 wells. Twelve wells also had detections in the January 1999 sampling, eight of which increased in the April 1999 sampling. Well MW-11 had the highest concentration of 1600 µg/L, a significant increase from 750 µg/L reported in January 1999. Well MW-14S had the second highest concentration of 820 µg/L, an increase from 77 µg/L detected in January 1999. Well MW-04 had the third highest concentration of 220 µg/L, a decrease from 520 µg/L detected in January 1999. The remaining wells with ethylbenzene detections had relatively low concentrations, ranging from 1.1 µg/L in MW-03 to 42 µg/L in MW-06B. Only wells MW-01S and MW-09 showed no detection of ethylbenzene in April 1999 which was a decrease from 2.0 µg/L and 100 µg/L, respectively. Wells MW-04A and MW-07, which had no detections in January 1999, had concentrations of 2.9 µg/L and 11 µg/L, respectively.

Total Xylenes

During the April 1999 sampling round, total xylenes were detected in 9 of the 14 wells, five of which increased in the April 1999 sampling. Eight wells had detections in the January 1999 sampling. The highest concentration of 1270 µg/L was detected in well MW-11, an increase from 970 µg/L reported in January 1999. The remaining wells with xylene detections had relatively low concentrations, ranging from 1.6 µg/L in MW-15D to 47 µg/L in MW-14S.

6.3 Inorganic and Miscellaneous Parameters

Table 6-4 shows the analytical results for inorganic parameters (cadmium, total and hexavalent chromium, copper, and pH) during the April 1999 sampling event.

Hexavalent Chromium (Cr^{+6})

During the April 1999 sampling, hexavalent chromium was detected in one on-site well, MW-04, at a concentration of 4.6 mg/L, which is a decrease from 78.6 mg/L in January 1999. It should be noted that a deviation exists between the hexavalent chromium concentration reported in the original sample and the duplicate, so the higher concentration (duplicate) is discussed here. The remaining four wells that in which hexavalent chromium was detected in January 1999 had no detections in April 1999. Figure 6-4 shows the concentration of hexavalent chromium detected in the shallow wells during the April 1999 sampling.

The water purged from MW-04 has typically been bright yellow in color since CDM began sampling the wells on a quarterly basis in January 1989. During the April 1999 sampling round, the color of water from MW-04 was again noted as yellow and the color of the water from MW-09 was also noted as yellow. Figure 6-5 shows the concentrations of hexavalent chromium and groundwater elevations in MW-04 over time.

The concentrations of hexavalent chromium at MW-04 decreased from July 1989 (120 mg/L) to April 1993 (1.8 mg/L), while groundwater elevations increased. Since April 1993, hexavalent chromium concentrations have fluctuated up and down while groundwater elevations have remained fairly constant. Historically, hexavalent chromium has been detected in two wells other than MW-04, although the highest concentration has always been detected at MW-04. At MW-14S from October 1990 to January 1993, hexavalent chromium concentrations generally decreased, with analytical non-detections reported for the last six sampling rounds previous to October 1994 and eight of the last 14 sampling rounds since then. In MW-09, hexavalent chromium concentrations decreased between October 1989 and January 1991 and except for a trace amount detected in October 1991, hexavalent chromium concentrations have been below detection limits until the January 1999 sampling event. A trace level of hexavalent chromium was detected in MW-15S for the first time during the January 1995 sampling event.

Total Chromium (Cr[T])

Total chromium was detected above the detection limit in five monitoring wells during the April 1999 sampling event. The highest concentration was detected in well MW-04 at a concentration of 42.8 mg/L, which is a decrease from 85.2 mg/L in January 1999. The remaining wells with total chromium detections had relatively low concentrations ranging from 0.012 mg/L in MW-04A to 0.64 mg/L in MW-09. Figure 6-6 shows the concentrations of total chromium detected in shallow monitoring wells during April 1999. Figure 6-7 shows the concentrations of total chromium and corresponding groundwater elevations in MW-04 over time.

TABLE 6-4
PHIBRO-TECH, INC.
April 1999 Quarterly Monitoring Well Sampling
Inorganic Analytical Results
(mg/L)

Well Identification	Cadmium	Chromium (Hexavalent)	Chromium (Total)	Copper	pH
	EPA- 6010B	EPA- 7196A	EPA- 6010B	EPA- 6010B	EPA- 150.1
PTI- MW01S	ND < 0.0050	ND < 0.025	ND < 0.010	ND < 0.025	**6.90**
PTI- MW01D	ND < 0.0050	ND < 0.025	ND < 0.010	ND < 0.025	**7.40**
PTI- MW03	ND < 0.0050	ND < 0.025	ND < 0.010	ND < 0.025	**7.20**
PTI- MW04	**0.41**	**4.6***	**42.8**	ND < 0.050	**6.70**
PTI- MW04A	ND < 0.0050	ND < 0.010	**0.012**	ND < 0.025	**7.54**
PTI- MW06B	ND < 0.0050	ND < 0.010	ND < 0.010	ND < 0.025	**7.01**
PTI- MW06D	ND < 0.0050	ND < 0.010	ND < 0.010	ND < 0.025	**7.26**
PTI- MW07	ND < 0.0050	ND < 0.010	ND < 0.010	**0.042**	**6.81**
PTI- MW09	ND < 0.0050	ND < 0.010	**0.64**	ND < 0.025	**6.70**
PTI- MW11	ND < 0.0050	ND < 0.010	ND < 0.010	ND < 0.025	**6.83**
PTI- MW14S	ND < 0.0050	ND < 0.010	ND < 0.010	ND < 0.025	**7.11**
PTI- MW15S	ND < 0.0050	ND < 0.010	**0.013**	ND < 0.025	**7.20**
PTI- MW15D	ND < 0.0050	ND < 0.010	**0.035**	ND < 0.025	**7.34**
PTI- MW16	ND < 0.0050	ND < 0.010	ND < 0.010	ND < 0.025	**6.90**
MCL	0.005	—	0.05	1	—
SGV GW	ND	ND	ND	ND-0.467	7.9-8.5

ND = Analytical parameter not detected.
NA = Parameter not analyzed
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area in the year 1996.
* Deviation exists between original and duplicate sample concentrations, so the higher value (duplicate) is shown here.

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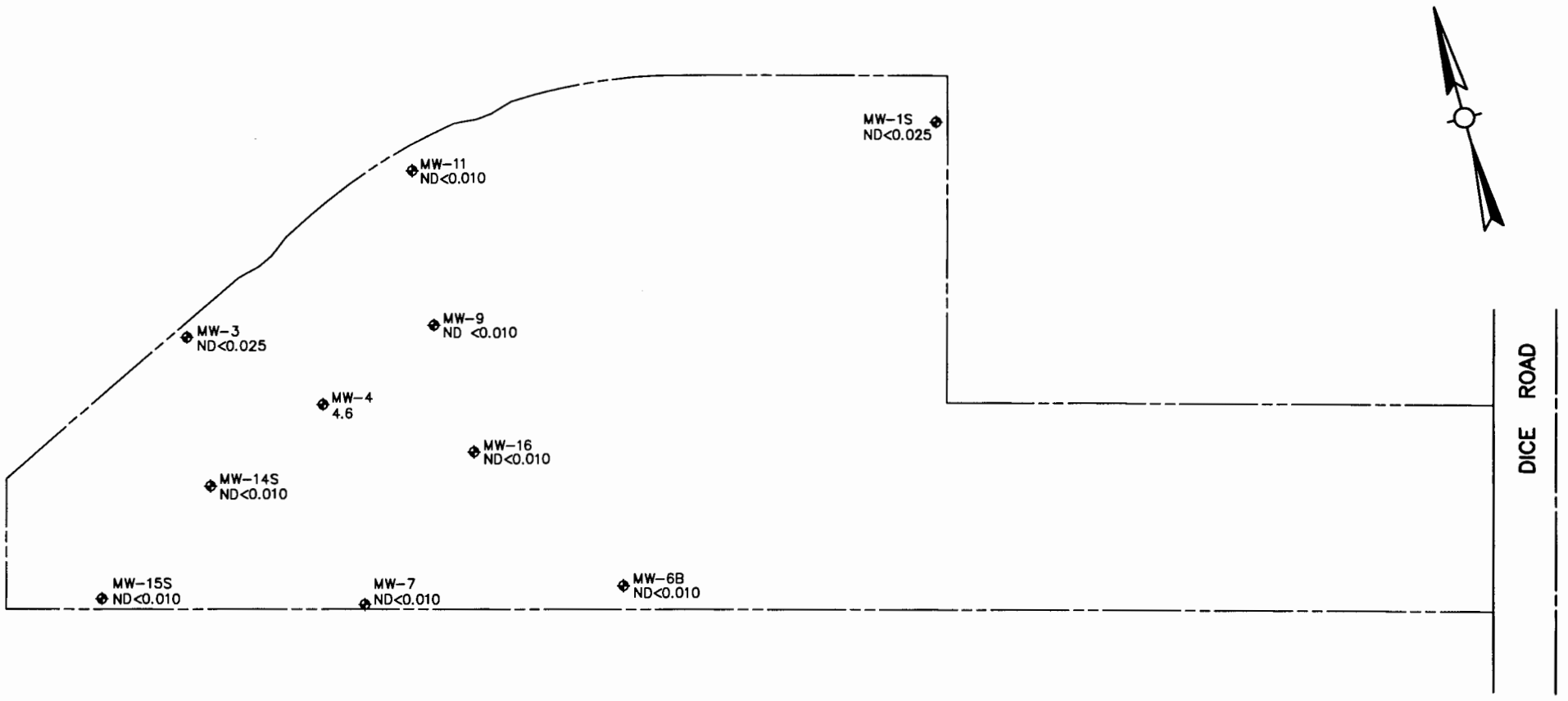

LEGEND

------	PROPERTY LINE
◆	MONITORING WELL
0.57	Cr^{+6} CONCENTRATION–METHOD 7196 (mg/L)
ND	NOT DETECTED

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

HEXAVALENT CHROMIUM CONCENTRATIONS – SHALLOW WELLS APRIL 1999

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Figure 6-4

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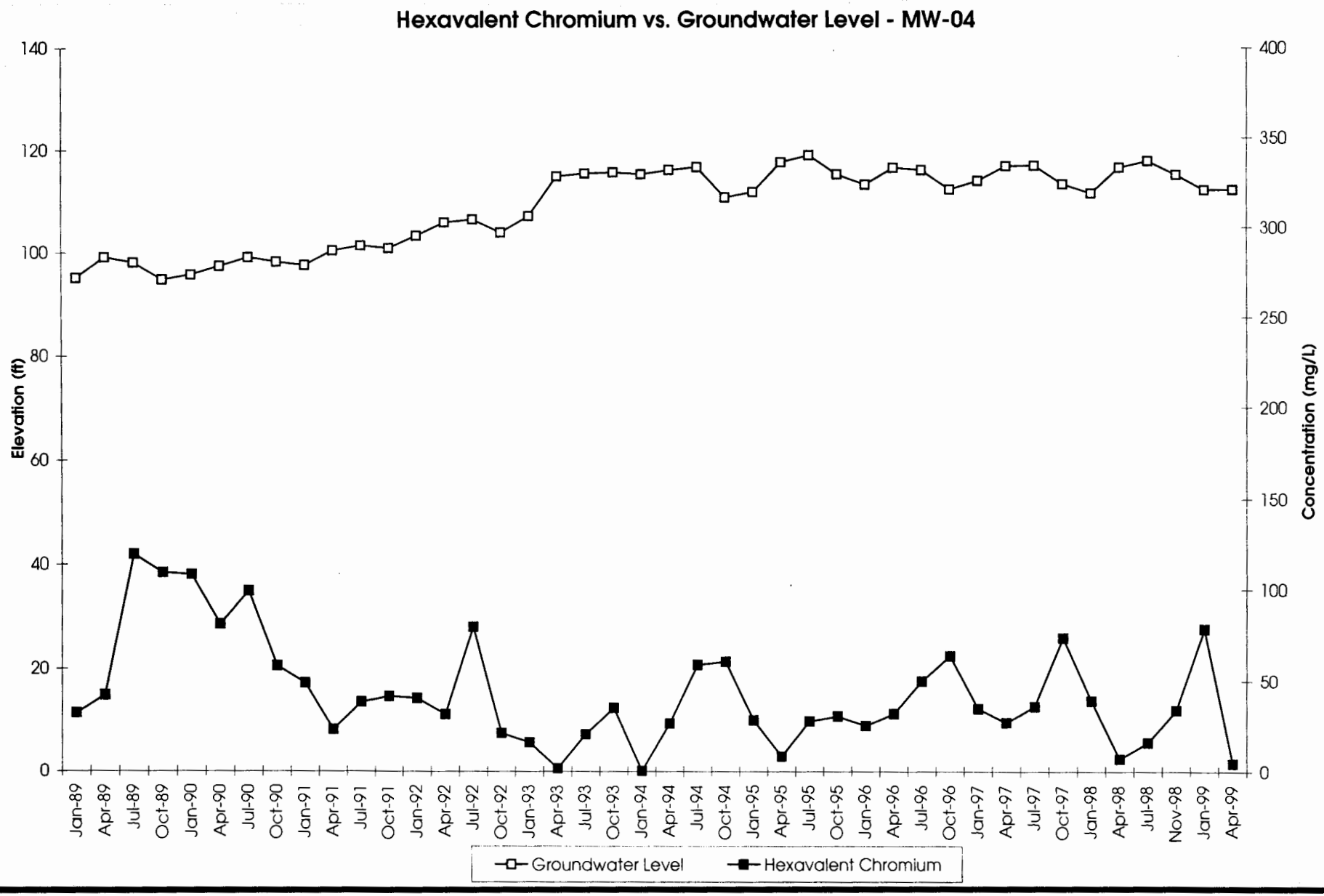

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HEXAVALENT CHROMIUM CONCENTRATIONS - GROUNDWATER ELEVATIONS
MW-04
JANUARY 1989 - APRIL 1999

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Figure 6-5

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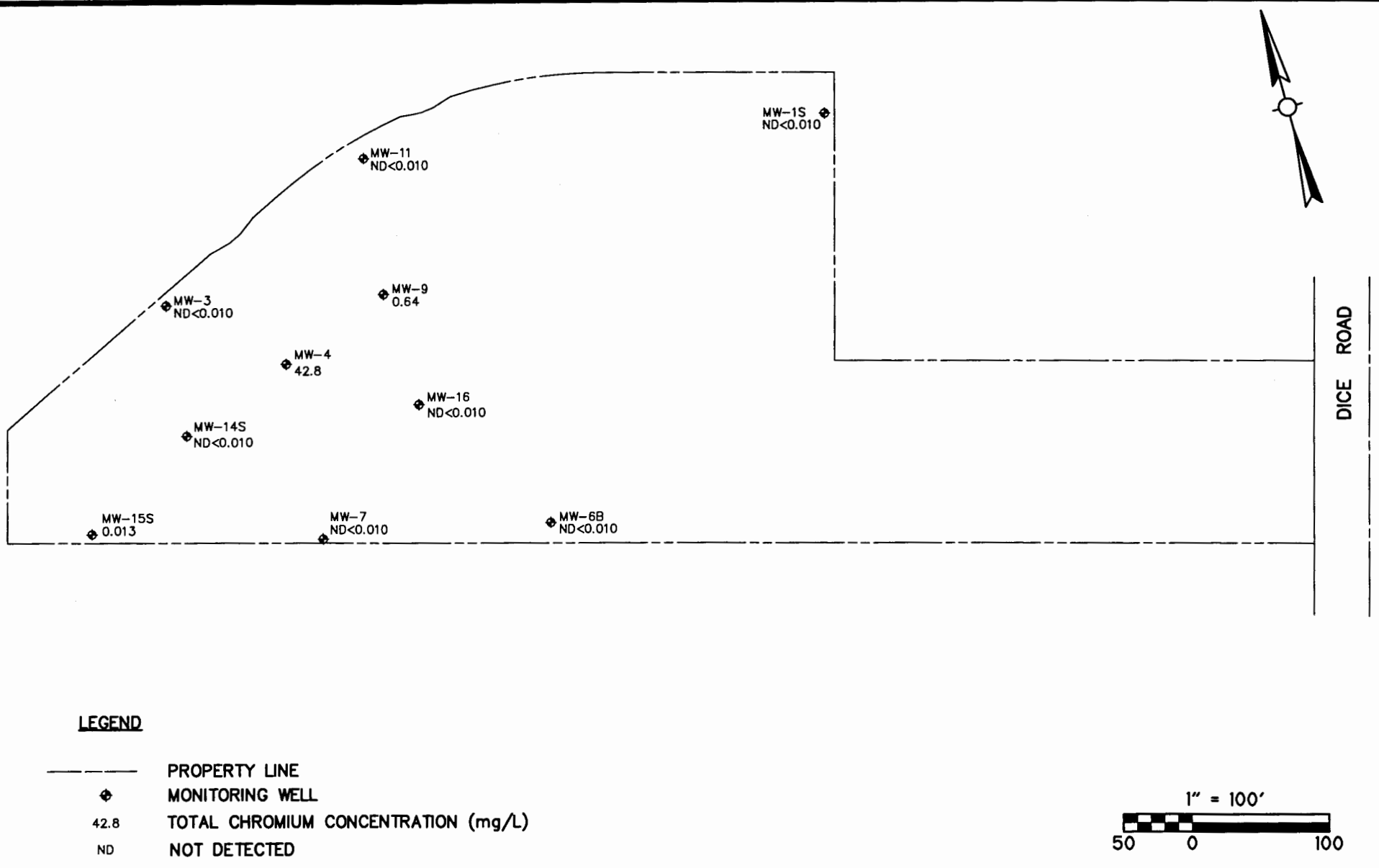

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TOTAL CHROMIUM CONCENTRATIONS – SHALLOW WELLS APRIL 1999

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Figure 6-6

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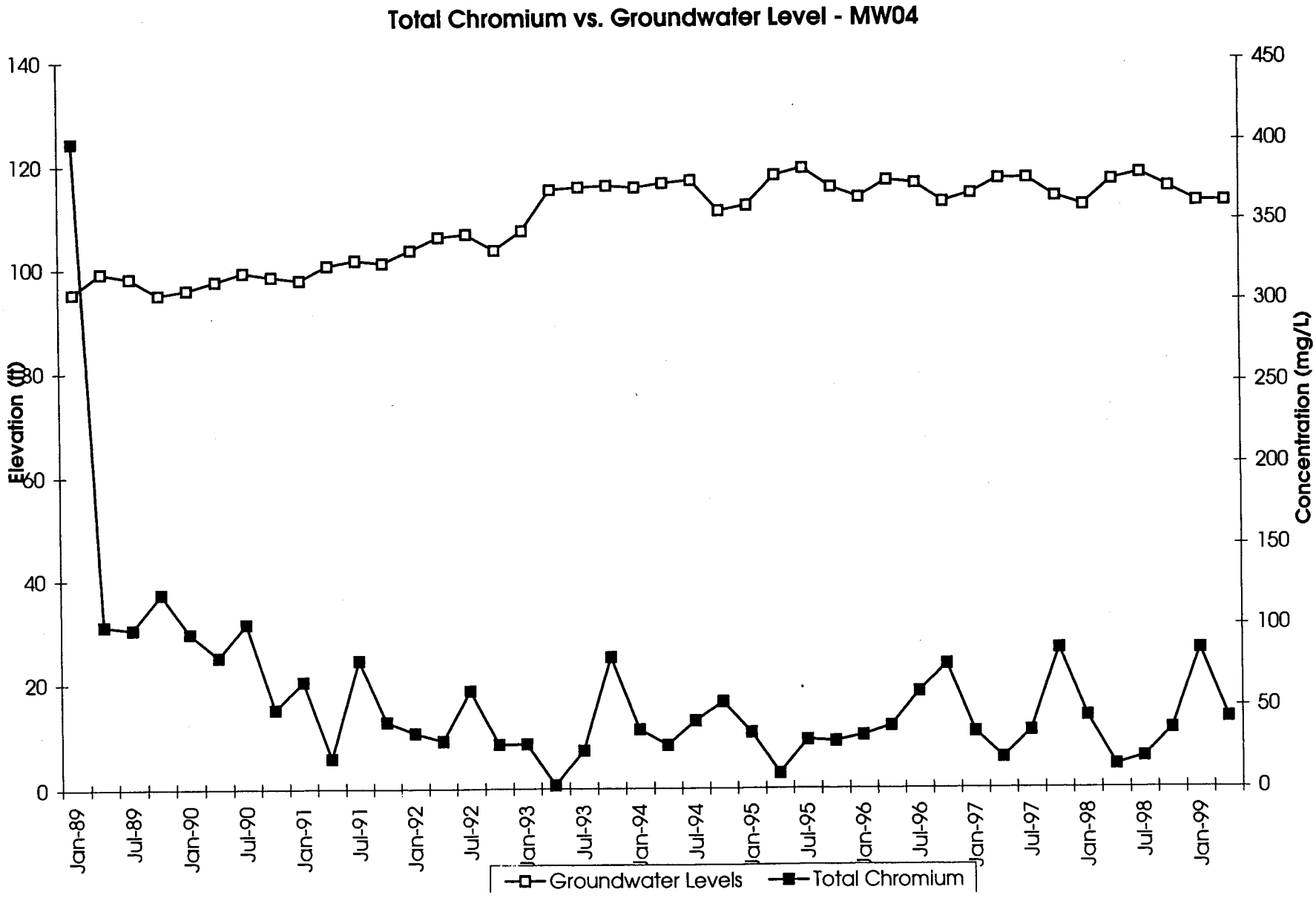

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TOTAL CHROMUIM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW-04
JANUARY 1989 – APRIL 1999

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Figure 6-7

Comparison of historical total chromium data with present data (Table 6-1) indicates that total chromium concentrations, like those of hexavalent chromium, generally decreased from January 1989 to April 1993, and have fluctuated up and down since April 1993. Historically, the highest total chromium concentrations have been detected in MW-04. Sporadic detections of total chromium close to the detection limit have occurred historically in nearly all shallow wells on site.

Cadmium (Cd)

During the April 1999 sampling event, cadmium was detected in one on-site well at a concentration greater than the MCL of 0.005. Well MW-04 had a concentration of 0.41 mg/L, a decrease from 0.58 mg/L in January 1999. Well MW-07 had no detectable cadmium, an decrease from 0.0056 mg/L in this well in January 1999.

Previous concentrations in MW-04 have ranged from 0.028 mg/L in January 1989 to 0.86 mg/L in July 1992. Figure 6-8 shows the cadmium concentrations detected in the on-site wells during April 1999. Figure 6-9 shows the concentrations of cadmium and corresponding groundwater elevations in MW-04 over time. As groundwater elevations have generally increased since January 1989, cadmium concentrations have also generally increased. As shown on the figure, cadmium concentrations have fluctuated considerably (i.e., from non-detectable at a detection limit of 0.005 mg/L during April 1993 to 0.86 mg/L during July 1992) since April 1990. Cadmium concentrations have consistently declined since October 1997 until the October 1998 sampling event when the concentration increased again.

Cadmium has been detected historically only in well MW-04, with the exceptions of 0.01 mg/L in MW-01 during July 1989, 0.005 to 0.018 mg/L in MW-14S during October 1990 through July 1991, 0.0055 mg/L in MW-14S during July 1995, and in MW-15S at low concentrations close to the detection limit from April 1991 to January 1993. Detected concentrations in MW-15S have ranged from 0.005 mg/L in July 1992 to 0.02 mg/L during October 1991.

Copper (Cu)

Copper was detected in one well, MW-07, at a concentration of 0.042 mg/L during the April 1999 sampling event, which was not above the MCL of 1.0 mg/L. This was a decrease from 0.050 mg/L in January 1999. Well MW-15D had no detectable copper, a decrease from 0.029 mg/L in January 1999. Figure 6-10 shows the copper concentrations detected in the on-site wells during April 1999. Historically, with the exception of well MW-14S, elevated concentrations of copper above the MCL have not been detected in on-site monitoring wells.

pH

Groundwater samples from all wells were measured for pH in the field during purging activities and also by the analytical laboratory on the samples submitted for analysis. Field pH measurements were recorded in the field log book during well purging. In April 1999, the field measurements of pH generally correlated with the values shown in Table 6-4, which range from 6.70 to 7.54.

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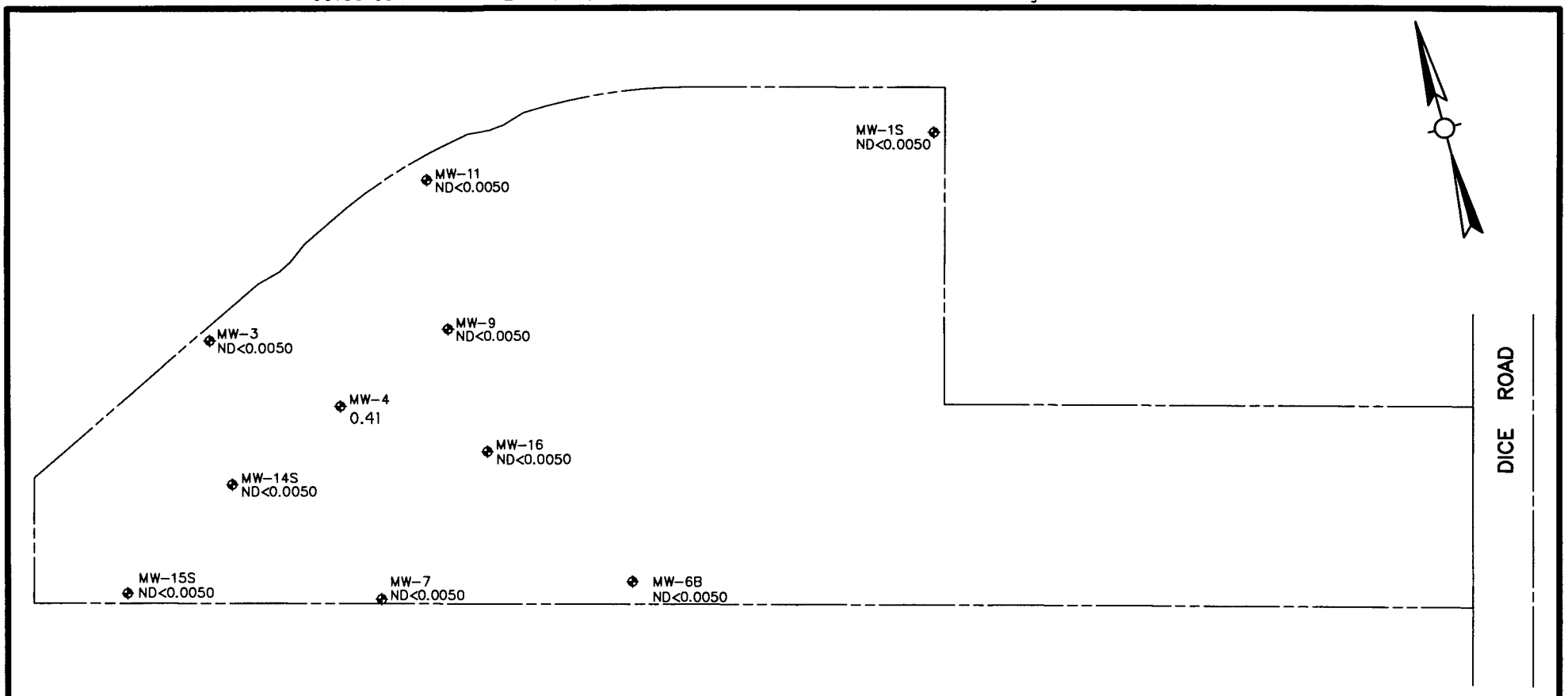

LEGEND

———	PROPERTY LINE
◆	MONITORING WELL
0.41	CADMIUM CONCENTRATION (mg/L)
ND	NOT DETECTED

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

CADMIUM CONCENTRATIONS – SHALLOW WELLS APRIL 1999

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Figure 6-8

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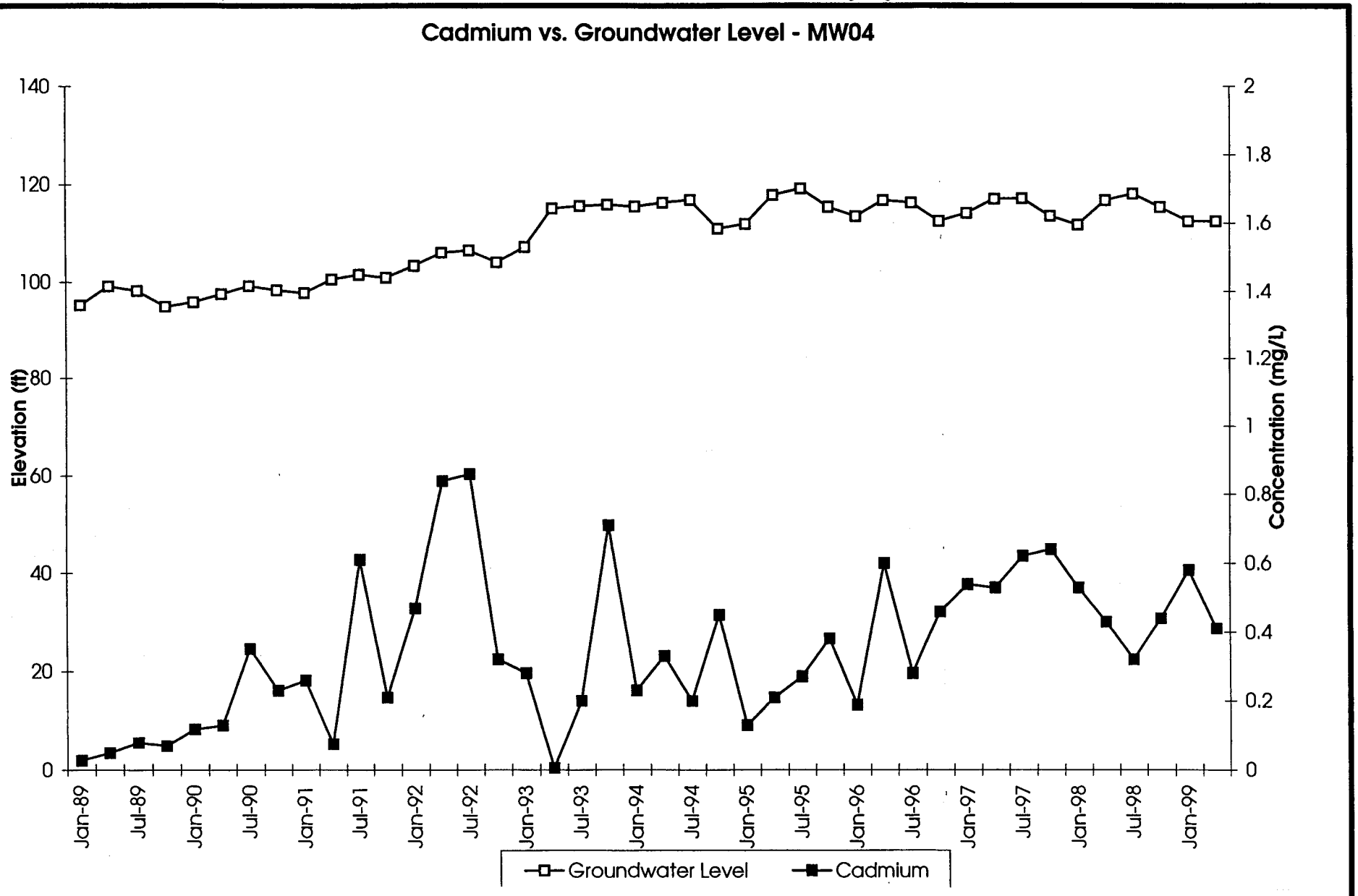

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

CADMIUM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW-04
JANUARY 1989 – APRIL 1999

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Figure 6-9

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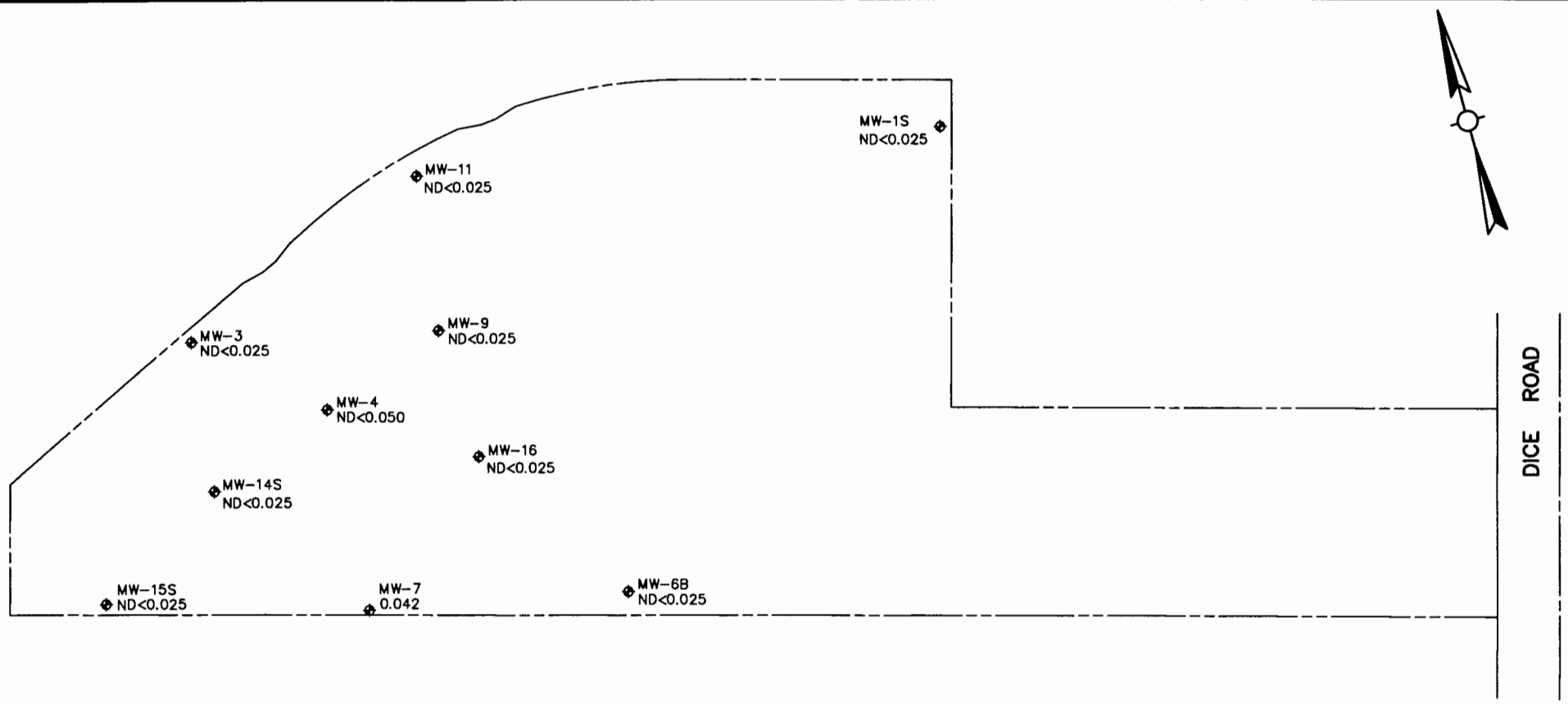

LEGEND

———	PROPERTY LINE
◆	MONITORING WELL
0.042	COPPER CONCENTRATION (mg/L)
ND	NOT DETECTED

1" = 100'

50 0 100

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COPPER CONCENTRATIONS – SHALLOW WELLS APRIL 1999

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Figure 6-10

Section 7
Statistical Evaluation

The following sections contain a statistical treatment of the monitoring data designed to determine if onsite wells have been impacted by metals, BTEX compounds (benzene, toluene, ethylbenzene, xylenes) or TCE (trichloroethene). The procedures used are based on the recommendations provided in the 1989 EPA Guidance document, *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities - Interim Final Guidance* and in the 1992 Addendum document. In some instances, methods which have not been recommended in the documents cited above were used. However, unrecommended techniques were only used to supplement the recommended procedures. When statistical methods outlined in the 1989 guidance document were superseded by the 1992 Addendum, the more recent recommendations were followed.

7.1 Determination of Background Upper Tolerance Limit

Overview

The upper tolerance limit (UTL) is a method that is typically used in compliance monitoring to compare downgradient wells to established maximum contaminant levels (MCLs) or alternate contaminant levels (ACLs). In short, the UTL represents the upper end of the tolerance interval, which is calculated at a specified confidence level and coverage. For instance, a UTL with 95 percent coverage and a 95 percent confidence level represents a value which, with 95 percent confidence, will be exceeded less than 5 percent of the time.

In the present evaluation, we have calculated UTLs for the background well (MW-1S) and compared this value to each individual downgradient analytical result using a confidence level and coverage of 95 percent. When onsite wells exceed the background UTL consistently, it suggests that a significant difference from background may exist. While this is not a recommended technique for detection monitoring, we have applied background UTLs as a screening tool and as a supplement to the more rigorous statistical comparisons that follow.

Methods

Inherent in the calculation of a parametric UTL is the assumption of a normal (or log normal) data distribution. One of the tests for normality recommended in the 1992 Addendum to the EPA guidance document is the probability plot. When a data set is normally distributed, the corresponding probability plot is linear. However, for the background well, the analyses have a high percentage of nondetects for most parameters. Therefore, the probability plots appear to be nonlinear (see Appendix E-3). Fortunately, several methods are available to adjust the mean and standard deviation (used in the calculation of the UTL) based on various treatment of nondetects that allow the use of a parametric UTL. In a parametric UTL, the magnitude of the analyses are considered, while in a nonparametric analysis, the data is ranked from highest to lowest and the UTL is calculated from the ranks. The choice of method depends on the percentage of nondetects in the population and on comparison of special probability plots designed to test the assumptions built into each model. Parametric methods for determination of the UTL are described below. When the percentage of nondetects is above 90 percent, the UTL is calculated using a nonparametric method employing the Poisson model. In the Poisson model, detected values are treated as "rare events," such that the probability of occurrence is low, but constant. The model takes into account both the

frequency of occurrence of detected values as well as the magnitude. Since the Poisson model is nonparametric, a normal or log normal data distribution is not required.

When the frequency of detect is greater than 10 percent and data are normally or log normally distributed, either the Atchison or Cohen adjustment is recommended. In the Atchison method, nondetects are assumed to equal zero, and therefore are not considered in the data distribution. In the Cohen adjustment, nondetects are assumed to have finite values between zero and the detection limit. Experience at EPA and USGS (EPA 1992) have shown that, in general, when the frequency of detect (FOD) is between 10 and 50 percent, Atchison's method is more valid; while between 50 and 90 percent FOD, Cohen's method is more valid. However, this is only a rule of thumb that should be verified periodically using the detects-only and censored probability plot method described above.

Results

The frequencies of detection for each parameter in the background well (MW-1S) is provided in Table 7-1. For hexavalent chromium, cadmium, and benzene, the FOD was less than 10 percent and the Poisson nonparametric method was used to calculate the UTL. Total chromium, copper, toluene, ethylbenzene, and total xylenes analyses were all between 10 and 50 percent FOD, suggesting that the Atchison adjustment should be employed before calculating the UTL. For trichloroethene (TCE), the data were both normally and log normally distributed (see Appendices E-2 and E-3) and the FOD was 100 percent; therefore, no adjustment was required, and the UTL was calculated directly.

The results of the UTL calculations and the comparison with each onsite well are presented in Table 7-2. Based on the number of analyses above the UTL for each onsite well, MW-3, MW-4, MW-7, MW-9, and MW-11 appear to differ from background with respect to the BTEX compounds. MW-4, MW-9, and MW-14S also appear to differ from background with respect to total chromium and copper. Note that the comparison of background UTLs to onsite wells described above is not definitive and will only be used in conjunction with the more in-depth statistical approaches that follow.

7.2 Comparison of Background and Onsite Wells

Overview

The recommended method for comparing onsite wells to background is the analysis of variance (ANOVA). There are two types of ANOVA — parametric and nonparametric. In order to use the parametric ANOVA, the data set must be normally or log normally distributed and the group variances must be equal. For the nonparametric approach, neither normality or equal variances are required, however, slightly larger datasets are needed to use a nonparametric method compared to the parametric ANOVA. The minimum number of analyses for the nonparametric test is 9, while for the parametric test, only 6 are required (EPA 1989).

The first assumption (normal or log normal distribution) should be tested using either the Shapiro-Wilk or probability plot method when the sample size is 50 or less. In general, the Shapiro-Wilk test is much more stringent than the probability plot since the method tends to focus on the "tails" of the distribution. The Lillifors, while not recommended in the Addendum, was suggested in the Interim Final Guidance (EPA 1989) and has been included for comparative purposes.

The test for equal group variances suggested in the Addendum to the Interim Final Guidance (EPA 1992) is the box plot. In a box plot, the extent of each box represent the 25th and 75th percentiles of the data set. Therefore, a long box tends to represent a larger variance than a short box. EPA (1992) recommends using a nonparametric ANOVA if the length of the largest box is equal to or greater than three times that of the smallest box. Another suggested criteria for a parametric ANOVA is a combined FOD, for both the background and the onsite well under consideration, of greater than 50 percent.

Methods

Normality tests were performed only for TCE (see Appendix E of the October 1998 report), since for the other parameters, the combined FOD was <50 percent, precluding the use of the parametric ANOVA method. Results of the probability plot, and Shapiro-Wilk tests are presented in Table 7-3, while the raw data are in Appendices E-2 and E-3, respectively. Due to the stringent nature of the Shapiro-Wilk test, less weight was given to this test than the probability plots when conflicting results were obtained. Based on Table 7-3 of the October 1998 report, the TCE data are log normal in all wells except MW-3, MW-6B, MW-9, and MW-4. The log normal data distribution is typical of environmental datasets where various degrees of dilution have occurred. The lack of normality or log normality precluded the use of a parametric ANOVA for wells MW-3 MW-6B, and MW-9.

In order to test the equal group variances assumption, box plots were constructed for TCE in each well (see Appendix E-4 of the October 1998 report). The results indicate that the background box is less than ⅓ the length of the box for well MW-6B, indicating that this well cannot be compared to background using a parametric ANOVA. However, all other wells met the equal variance requirement.

A summary of the ANOVA method used is as follows:

MW-4, MW-11, MW-14S, MW-15S, and MW-16 for TCE — parametric ANOVA using ½ D.L. for nondetects

All other parameters and wells — nonparametric, Kruskal Wallis Mann Whitney U Test

Note that ½ D.L. was used when the FOD was greater than 85 percent in a single well.

Results

The results of the nonparametric and parametric ANOVA tests are included in Appendices E-2 and E-3, respectively, while a summary is provided in Table 7-3. An " R" indicates that the null hypothesis was rejected, or that the two wells are not the same, while an "A" indicates the null hypothesis was accepted. In general, the results are similar to the UTL comparisons; except well MW-16 appears to differ from background with respect to the BTEX compounds. The results for TCE were obtained using both the normal and log normal assumptions for comparative purposes. The results indicate that, regardless of the data distribution, only well MW-6B was the same as background with respect to TCE. Since the last quarter, ethylbenzene in well MW-6B and copper in WW-7 are no longer the same as background. However, hexavalent chromium in well MW-9, which was predicted to be different from background last quarter, is now predicted to be the same.

Table 7-1
Percent of Total Samples in Shallow Wells Reported Above the Detection Limit
Quarterly Data: January 1989 to April 1999 at Philbro-Tech, Inc.

Parameter	*MW-1S*	*MW-3*	*MW-4*	*MW6B*	*MW-7*	*MW-9*	*MW-11*	*MW-14S*	*MW-15S*	*MW-16*
Number Samples (n)	42	42	42	38	42	42	42	34	35	29
Metals (mg/L) (%)										
Hexavalent chromium	2.4	2.4	100.0	0	2.4	23.8	2.4	50.0	5.7	0
Total chromium	11.9	7.1	97.6	29.0	21.4	35.7	11.9	82.3	37.1	6.9
Cadmium	2.4	0	97.6	0	4.8	4.8	0	17.6	20.0	0
Copper	23.8	11.9	33.3	5.3	42.9	11.9	26.2	52.9	14.3	17.2
Aromatics (µg/L) (%)										
Benzene	2.4	11.9	19.1	0	21.4	7.1	0	17.6	0	0
Toluene	9.8	17.1	36.6	43.2	17.1	39.0	46.3	21.2	29.4	21.4
Ethylbenzene	31.0	52.4	85.7	44.7	45.2	71.4	88.1	76.5	57.1	82.8
Total xylenes	33.3	42.9	85.7	50.0	35.7	59.5	73.8	64.7	57.1	51.7
Halocarbons (µg/L) (%)										
Trichloroethene	100.0	97.6	92.9	100.0	100.0	92.9	95.2	100.0	97.1	100.0

% = Percent detected

Table 7-2
Definition of Upper Tolerance Levels in Background Shallow Wells
Quarterly Data: January 1989 to April 1999 at Philbro-Tech, Inc.

Parameter	% Detected in Bkgd [1]	Tolerance Limit Method	Upper Tolerance Limit [2]	Upper Tolerance Limit Exceeded								
				MW-3 40 [3]	MW-4 40	MW-6B 36	MW-7 40	MW-9 40	MW-11 40	MW-14S 32	MW-15S 33	MW-16 27
Metals (mg/L)												
Hexavalent chromium	2.4	P	0.22	1	42 [4]	–	–	7	–	4	–	–
Total chromium	11.9	A	0.046	2	42 (1)	1	2	13	–	14 (1)	–	–
Cadmium	2.4	P	0.13	–	33	–	–	–	–	–	–	–
Copper	28.8	A	0.03	4 (1)	10 (3)	3 (1)	13 (2)	4 (1)	8 (1)	10	4	3
Aromatics (µg/L)												
Benzene	2.4	P	1.32	9 (7) [5]	28 (24)	1 (1)	6 (5)	29 (26)	19 (19)	5 (5)	1 (1)	11 (11)
Toluene	9.8	A	1.42	15 (8)	33 (18)	14 (1)	11 (7)	31 (15)	32 (13)	10 (5)	10 (1)	17 (12)
Ethylbenzene	31.0	A	1.97	17 (3)	37 (2)	16 (1)	18 (5)	34 (5)	39 (3)	25	18	24 (2)
Total xylenes	33.3	A	7.15	10 (3)	37 (3)	9	4 (1)	28 (4)	26 (3)	13	9	12 (4)
Halocarbons (µg/L)												
Trichloroethene	100.0	T	17.47	33 (1)	42 (3)	11	41	41 (3)	40	33	2	27

[1] MW-1S is background shallow well, n = 40
[2] In ppm or ppb, as noted for groups
[3] Number of samples collected at corresponding well
[4] Number of samples that exceed upper tolerance level at corresponding well
[5] (6) number of samples exceeding limit that are reported as ND
– = None of samples exceeded the upper tolerance limit
P = Poisson
A = Atchison adjusted
T = Unadjusted limit

Table 7-3 *Comparison of Background and Onsite Shallow Wells* *Quarterly Data: January 1989 to April 1999 at Phibro-Tech, Inc.*									
Parameter	***MW-3***	***MW-4***	***MW-6B***	***MW-7***	***MW-9***	***MW-11***	***MW-14S***	***MW-15S***	***MW-16***
Metals (mg/L)									
Hexavalent chromium [1]	A	R	A	A	A	A	R	A	A
Total chromium [1]	A	R	R	A	R	A	R	A	A
Cadmium [1]	A	R	A	A	A	A	A	A	A
Copper [1]	A	A	A	R	A	A	R	A	A
Aromatics (µg/L)									
Benzene [1]	R	R	A	R	R	R	R	A	R
Toluene [1]	R	R	R	R	R	R	R	A	R
Ethylbenzene [1]	R	R	A	R	R	R	R	R	R
Total xylenes [1]	R	R	R	A	R	R	R	A	R
Halocarbons (µg/L)									
Trichloroethene [2]	R [3]	R [4]/R [5]	A [3]	R [3]	R/R	R [3]	R/R	R/R	R/R

[1] Background to onsite comparison by Mann Whitney U Method, using D.L. for ND, at 95 percent confidence level

[2] Background to onsite comparison by one way ANOVA Method using ½ D.L. for ND

[3] Nonparametric comparison used for TCE

[4] Normal Distribution used in comparison

[5] Log normal Distribution used in comparison

A Null Hypothesis, that means are equal, is accepted

R Null Hypothesis, that means are equal, is rejected

R/R Null Hypothesis, rejected using parametric (top letter) and nonparametric (bottom letter) tests

Section 8
Assessment of Quarterly Groundwater Monitoring Program Status

In the October 1990 groundwater monitoring report, changes in the quarterly groundwater sampling program were proposed. These changes were first implemented during the April 1991 sampling event and included reducing the number of wells sampled and parameters analyzed in each well. The current groundwater sampling program will only be used as an interim groundwater sampling program, until a remediation alternative from the Corrective Measures Study (CMS) has been selected by EPA.

The analytical parameters for the April 1999 quarterly monitoring were as follows:

Wells	*Purgeable Halogenated/ Aromatic Organics (EPA 8260)*	*Chromium, Cadmium, Copper*	*Hexavalent Chromium*	*pH*
MW-01S, MW-01D	X	X	X	X
MW-03, MW-04A	X	X	X	X
MW-11 MW-06B	X	X	X	X
MW-06D, MW-07	X	X	X	X
MW-09, MW-04	X	X	X	X
MW-14S, MW-15S	X	X	X	X
MW-15D, MW-16	X	X	X	X

Beginning with the January 1997 sampling event, EPA Method 8010/8020 was replaced with EPA Method 8260. This change was requested by the analytical laboratory, which no longer performs 8010/8020 analysis. Methyl tertiary butyl ether (MTBE) analysis was performed once, in January 1997. Since there were no detections of MTBE in any of the groundwater samples, this analysis was discontinued.

Statistical analysis has been conducted annually. Beginning with the October 1993 sampling event, statistical analysis has been performed on a quarterly basis, as requested by DTSC.

The proposed July 1999 quarterly monitoring includes sampling the 14 wells for purgeable halogenated/aromatic organics using EPA Method 8260, chromium, cadmium, copper, hexavalent chromium, and pH. The water levels at the 14 wells sampled, in addition to the remaining unsampled wells, will also be measured.

Section 9
References

Camp Dresser & McKee Inc., Groundwater Modeling Study, Southern California Chemical, January 1993.

_____, RCRA Facility Investigation Work Plan Addendum, Southern California Chemical, February 13, 1992, Revised March 6, 1992.

_____, RCRA Facility Investigation Report, Southern California Chemical, December 6, 1991.

_____, RCRA Facility Investigation Work Plan, Southern California Chemical, June 26, 1990.

_____, Current Conditions Report, Southern California Chemical, June 8, 1990.

City of Santa Fe Springs, 1996 Annual Water Quality Report, 1996.

J.H. Kleinfelder & Associates, Quality Assurance Project Plan, Southern California Chemical, May 1988.

_____, Draft Environmental Assessment, Southern California Chemical, January 1986.

Appendix A
General Analytical Detection Limits

TABLE A-1
PHIBRO-TECH, INC.
HEAVY METALS AND INORGANICS ANALYSIS
Typical Detection Limits

Method Number	Analytical Parameter	Detection Limit	Units
EPA 6010-L	Antimony	0.06	mg/L
EPA 6010-L	Barium	0.01	mg/L
EPA 6010-L	Beryllium	0.002	mg/L
EPA 6010-L	Cadmium	0.005	mg/L
EPA 6010-L	Chromium	0.01	mg/L
EPA 6010-L	Cobalt	0.01	mg/L
EPA 6010-L	Copper	0.02	mg/L
EPA 6010-L	Lead	0.05	mg/L
EPA 6010-L	Molybdenum	0.02	mg/L
EPA 6010-L	Nickel	0.04	mg/L
EPA 6010-L	Silver	0.01	mg/L
EPA 6010-L	Thallium	0.5	mg/L
EPA 6010-L	Tin	0.1	mg/L
EPA 6010-L	Vanadium	0.01	mg/L
EPA 6010-L	Zinc	0.02	mg/L
EPA 7196	Chromium, Hexavalent	0.02	mg/L
EPA 7061-L	Arsenic	0.005	mg/L
EPA 9012	Cyanide, Total	0.01	mg/L
EPA 7470	Mercury	0.001	mg/L
EPA 300.0	Chloride	5	mg/L
EPA 300.0	Nitrate	0.2	mg/L
EPA 7741-L	Selenium	0.1	mg/L
EPA 376.2	Sulfide, as Sulfur	1.2	mg/L

TABLE A-2
PHIBRO-TECH, INC.
VOLATILE ORGANIC COMPOUNDS
Typical Detection Limits

Method Number	Analytical Parameter	Detection Limit	Units
EPA 8260	Benzene	0.5	µg/L
EPA 8260	Toluene	1.0	µg/L
EPA 8260	Ethylbenzene	1.0	µg/L
EPA 8260	Xylenes, Total	1.0	µg/L
EPA 8260	Chloromethane	1.0	µg/L
EPA 8260	Bromomethane	1.0	µg/L
EPA 8260	Vinyl Chloride	1.0	µg/L
EPA 8260	Chloroethane	1.0	µg/L
EPA 8260	Methylene Chloride	1.0	µg/L
EPA 8260	Trichlorofluoromethane	1.0	µg/L
EPA 8260	1,1-Dichloroethene	1.0	µg/L
EPA 8260	1,1-Dichloroethane	1.0	µg/L
EPA 8260	trans-1,2-Dichloroethene	1.0	µg/L
EPA 8260	Chloroform	1.0	µg/L
EPA 8260	1,2-Dichloroethane	1.0	µg/L
EPA 8260	1,1,1-Trichloroethane	1.0	µg/L
EPA 8260	Carbon Tetrachloride	1.0	µg/L
EPA 8260	Bromodichloromethane	1.0	µg/L
EPA 8260	1,2-Dichloropropane	1.0	µg/L
EPA 8260	trans-1,3-Dichloropropene	1.0	µg/L
EPA 8260	Trichloroethene	1.0	µg/L
EPA 8260	Dibromochloromethane	1.0	µg/L
EPA 8260	1,1,2-Trichloroethane	1.0	µg/L
EPA 8260	cis-1,3-Dichloropropene	1.0	µg/L
EPA 8260	2-Chloroethylvinyl ether	1.0	µg/L
EPA 8260	Bromoform	1.0	µg/L
EPA 8260	Tetrachloroethene	1.0	µg/L
EPA 8260	1,1,2,2-Tetrachloroethane	1.0	µg/L
EPA 8260	Chlorobenzene	1.0	µg/L
EPA 8260	1,2-Dichlorobenzene	1.0	µg/L
EPA 8260	1,3-Dichlorobenzene	1.0	µg/L
EPA 8260	1,4-Dichlorobenzene	1.0	µg/L

Appendix B
Quanterra Analytical Reports

Précis
A Quanterra Product

Quanterra
1721 South Grand Ave.
Santa Ana, CA 92705

Tel (714) 258-8610
Fax (714) 258-0921

May 4, 1999

QUANTERRA INCORPORATED LOT NUMBER: E9D200209
PO/CONTRACT: 2279-11462-111.FLD
AFE#1891-1/PO#05620

Ed Vigil
Phibro-Tech, Inc.
8851 Dice Road
Santa Fe Springs, Ca 90670

Dear Mr. Vigil,

This report contains the analytical results for the five samples received under chain of custody by Quanterra Incorporated on April 20, 1999. These samples are associated with your PTI - Santa Fe Springs project.

All applicable quality control procedures met method-specified acceptance criteria. Please note for pH analysis a LCS was created in lieu of a sample duplicate. Reanalysis was not possible due to hold time restraints.

This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Diane Suzuki
Project Manager

CC: Sharon Wallin, CDM – Irvine
Project File

QUANTERRA INC. - SANTA ANA
PROJECT RECEIPT CHECKLIST

Date: 4/20/99

Quantims Lot #: E9D200209 | Quote #:

Client Name: GM/ Phibrotech | Project: PTI

Received by: N Martin | Date/Time Received: 4/20 1600

Delivered by : ☐Client ☐Airborne ☐Fed Ex ☐DHL ☐Ultra-Ex ☐Rey B.
☐UPS ☐ATD ☐Other

	Initial / Date
Custody Seal Status: ☐Intact ☐Broken ☐None	RM 4/20
Custody Seal #(s): ☐No Seal #	
Sample Container(s): ☐Quanterra ☐Client ☐N/A	
Temperature(s) (COOLER/BLANK) in °C: (CORRECTED TEMP)	
Thermometer Used : ☐IR (Infra-red) ☐Digital (Probe)	
Samples: ☐Intact ☐Broken ☐Other	
Anomalies: ☐No ☐Yes (See Clouseau)	
Labeled by	
Labeling checked by	

Short-Hold Notification: ☑Ph ☐Wet Chem ☐Metals (Filter/Pres) ☐Encore ☐N/A

Outside Analysis(es) (Test/Lab/Date Sent Out) :

Cr+6 to Del Mar 4/20/99
(E9D200206)

********** LEAVE NO BLANK SPACES ; USE N/A **********

Fraction	1/4	-5									PH
VOAh /*	3	3									N/A
~~250PB~~	1										N/A
500 PBn	1										<2

h:HCl s:H2SO4 na:Sodium Hydroxide znna: Sodium Hydroxide + Zinc Acetate n:HNO3 n/f:HNO3 field filtered
* Number VOA's w/ air bubbles present n/f/l:HNO3 Lab filtered

LOGGED BY/DATE: RM 4/20/99 REVIEWED BY/DATE:

PRC Ver. 4 021599

E9D200206 → Cr+6 to Delmar

C01C099

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Analytical Data Report

Client: PHIBRO-TECH, INC.

GC/MS Volatiles

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Laboratory/Client Sample Cross-Reference

Lab Sample ID	Client Sample ID	Date	Matrix
E9D200209-001	PTI-DI-043	04/20/99	Water
E9D200209-002	PTI-MW1S-043	04/20/99	Water
E9D200209-003	PTI-MW1D-043	04/20/99	Water
E9D200209-004	PTI-MW03-043	04/20/99	Water
E9D200209-005	PTI-TB01-043	04/20/99	Water

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Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-DI-043
Lab Sample ID: E9D200209-001

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9112103
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/21/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	ND	1.0	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	98	70-130	
1,2-Dichloroethane-d4	108	60-140	
Toluene-d8	101	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW1S-043
Lab Sample ID: E9D200209-002

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9112103
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/21/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	**1.6**	**1.0**	
1,1-Dichloroethene	**1.0**	**1.0**	
cis-1,2-Dichloroethene	**2.5**	**1.0**	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**1.8**	**1.0**	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**7.2**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	100	70-130	
1,2-Dichloroethane-d4	117	60-140	
Toluene-d8	100	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW1D-043
Lab Sample ID: E9D200209-003

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9112103
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/21/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**1.6**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**2.1**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	101	70-130	
1,2-Dichloroethane-d4	110	60-140	
Toluene-d8	102	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW03-043
Lab Sample ID: E9D200209-004

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9112103
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/21/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	**38**	**1.0**	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	**24**	**1.0**	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	**1.4**	**1.0**	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	**2.7**	**1.0**	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**1.1**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**1.6**	**1.0**	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**21**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	96	70-130	
1,2-Dichloroethane-d4	107	60-140	
Toluene-d8	98	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-TB01-043
Lab Sample ID: E9D200209-005

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9112103
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/21/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	ND	1.0	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	101	70-130	
1,2-Dichloroethane-d4	114	60-140	
Toluene-d8	98	70-130	

Prēcis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Metals

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-DI-043
Lab Sample ID: E9D200209-001

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9111306
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/20/99
Date Prepared: 04/21/99
Date Analyzed: 04/27/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW1S-043
Lab Sample ID: E9D200209-002

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9111306
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/20/99
Date Prepared: 04/21/99
Date Analyzed: 04/27/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW1D-043
Lab Sample ID: E9D200209-003

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9111306
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/20/99
Date Prepared: 04/21/99
Date Analyzed: 04/27/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW03-043
Lab Sample ID: E9D200209-004

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9111306
Matrix: Water
Units: mg/L

Method: 6010B
Preparation: 3005A

Date Sampled: 04/20/99
Date Prepared: 04/21/99
Date Analyzed: 04/27/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Prēcis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Classical Chemistry

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-DI-043
Lab Sample ID: E9D200209-001

pH (9040B) - Aqueous
pH - Aqueous

Batch: 9112230
Matrix: Water
Units: No Units

Method: 9040B
Preparation: 9040B

Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/20/99

Analyte	Result	RL	Dil. Factor	Qualifier
pH	8.1	0.10	1	

Client Sample ID: PTI-MW1S-043
Lab Sample ID: E9D200209-002

pH (9040B) - Aqueous
pH - Aqueous

Batch: 9112230
Matrix: Water
Units: No Units

Method: 9040B
Preparation: 9040B

Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/20/99

Analyte	Result	RL	Dil. Factor	Qualifier
pH	6.9	0.10	1	

Client Sample ID: PTI-MW1D-043
Lab Sample ID: E9D200209-003

pH (9040B) - Aqueous
pH - Aqueous

Batch: 9112230
Matrix: Water
Units: No Units

Method: 9040B
Preparation: 9040B

Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/20/99

Analyte	Result	RL	Dil. Factor	Qualifier
pH	7.4	0.10	1	

Prēcis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW03-043
Lab Sample ID: E9D200209-004

pH (9040B) - Aqueous
pH - Aqueous

Batch: 9112230
Matrix: Water
Units: No Units

Method: 9040B
Preparation: 9040B

Date Sampled: 04/20/99
Date Prepared: 04/20/99
Date Analyzed: 04/20/99

Analyte	Result	RL	Dil. Factor	Qualifier
pH	7.2	0.10	1	

Quality Control Batch Assignment Report

Lab Sample ID	Matrix	Method	Batch ID	MS Run Number
Metals				
E9D200209-001	WATER	6010B	9111306	9111124
E9D200209-002	WATER	6010B	9111306	9111124
E9D200209-003	WATER	6010B	9111306	9111124
E9D200209-004	WATER	6010B	9111306	9111124
E9D210141-006	WATER	6010B	9111306	9111124
GC/MS Volatiles				
E9D200182-001	WATER	8260B	9112103	9112004
E9D200209-001	WATER	8260B	9112103	9112004
E9D200209-002	WATER	8260B	9112103	9112004
E9D200209-003	WATER	8260B	9112103	9112004
E9D200209-004	WATER	8260B	9112103	9112004
E9D200209-005	WATER	8260B	9112103	9112004
Classical Chemistry				
E9D200209-001	WATER	9040B	9112230	
E9D200209-002	WATER	9040B	9112230	
E9D200209-003	WATER	9040B	9112230	
E9D200209-004	WATER	9040B	9112230	

Metals

Précis
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Quality Control Reports

Batch ID: 9111306

Inductively Coupled Plasma (6010B)

Method Blank

Lab Sample ID: E9D210000-306B
Matrix: Water
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
Cadmium	ND	0.0050		04/27/99
Chromium	ND	0.010		04/27/99
Copper	ND	0.025		04/27/99

Laboratory Control Sample

Lab Sample ID: E9D210000-306C
Matrix: Water
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Cadmium	0.0500	0.0475	95	80-120	
Chromium	0.200	0.197	99	80-120	
Copper	0.250	0.240	96	80-120	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D210141-006S
Matrix: Water
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Cadmium	ND	0.0500	0.0490	0.0490	98	98	80-120	0.14		
Chromium	ND	0.200	0.207	0.203	103	102	80-120	1.6		
Copper	ND	0.250	0.261	0.258	105	103	80-120	1.5		

Classical Chemistry

Précis
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Quality Control Reports

Batch ID: 9112230

pH (9040B) - Aqueous

Laboratory Control Sample

Lab Sample ID: E9D220000-230C
Matrix: Water
Units: No Units

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
pH	10.0	10.1	101	90-110	

GC/MS Volatiles

Batch ID: 9112103

Volatile Organics, GC/MS (8260B)

Method Blank

Lab Sample ID: E9D220000-103B
Matrix: Water
Units: ug/L

Analyte	Result	RL	Qual.	Date Analyzed
Benzene	ND	1.0		04/20/99
Bromodichloromethane	ND	1.0		04/20/99
Bromoform	ND	1.0		04/20/99
Bromomethane	ND	2.0		04/20/99
Carbon tetrachloride	ND	1.0		04/20/99
Chlorobenzene	ND	1.0		04/20/99
Dibromochloromethane	ND	1.0		04/20/99
Chloroethane	ND	2.0		04/20/99
Chloroform	ND	1.0		04/20/99
Chloromethane	ND	2.0		04/20/99
1,2-Dichlorobenzene	ND	1.0		04/20/99
1,3-Dichlorobenzene	ND	1.0		04/20/99
1,4-Dichlorobenzene	ND	1.0		04/20/99
1,1-Dichloroethane	ND	1.0		04/20/99
1,2-Dichloroethane	ND	1.0		04/20/99
1,1-Dichloroethene	ND	1.0		04/20/99
cis-1,2-Dichloroethene	ND	1.0		04/20/99
trans-1,2-Dichloroethene	ND	1.0		04/20/99
1,2-Dichloropropane	ND	1.0		04/20/99
cis-1,3-Dichloropropene	ND	1.0		04/20/99
trans-1,3-Dichloropropene	ND	1.0		04/20/99
Ethylbenzene	ND	1.0		04/20/99
Methylene chloride	ND	1.0		04/20/99
1,1,2,2-Tetrachloroethane	ND	1.0		04/20/99
Tetrachloroethene	ND	1.0		04/20/99
Toluene	ND	1.0		04/20/99
1,1,1-Trichloroethane	ND	1.0		04/20/99
1,1,2-Trichloroethane	ND	1.0		04/20/99
Trichloroethene	ND	1.0		04/20/99
Trichlorofluoromethane	ND	2.0		04/20/99
Vinyl chloride	ND	2.0		04/20/99
m-Xylene & p-Xylene	ND	1.0		04/20/99
o-Xylene	ND	1.0		04/20/99

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	100	70-130	
1,2-Dichloroethane-d4	105	60-140	
Toluene-d8	101	70-130	

Batch ID: 9112103

Volatile Organics, GC/MS (8260B)

Laboratory Control Sample

Lab Sample ID: E9D220000-103C
Matrix: Water
Units: ug/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Benzene	10.0	10.4	104	70-130	
Chlorobenzene	10.0	10.9	109	70-130	
1,1-Dichloroethene	10.0	11.2	112	60-140	
Toluene	10.0	10.8	108	70-130	
Trichloroethene	10.0	11.5	115	70-130	
Surrogate					
Bromofluorobenzene	10.0	10.3	103	70-130	
1,2-Dichloroethane-d4	10.0	10.9	109	60-140	
Toluene-d8	10.0	10.4	104	70-130	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D200182-001S
Matrix: Water
Units: ug/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Benzene	ND	10.0	10.0	10.5	100	105	70-130	4.2		
Chlorobenzene	ND	10.0	9.93	10.5	99	105	70-130	5.4		
1,1-Dichloroethene	ND	10.0	9.75	10.5	98	105	60-140	7.2		
Toluene	ND	10.0	9.51	10.1	95	101	70-130	6.1		
Trichloroethene	ND	10.0	10.6	11.0	106	110	70-130	3.5		
Surrogate										
Bromofluorobenzene	9.7	10.0	10.7	11.1	107	111	70-130			
1,2-Dichloroethane-d4	11	10.0	11.8	12.0	118	120	60-140			
Toluene-d8	10	10.0	10.3	10.8	103	108	70-130			

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Subcontract Analyses

Classical Chemistry

Del Mar Analytical

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9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (602) 785-0043 FAX (602) 785-0851

LABORATORY REPORT

Prepared For: Quanterra, Inc.
1721 South Grand Avenue
Santa Ana, CA 92705

Attention: Keith Aleckson
Project: E9D200206

Sampled: 4/20/99
Received: 4/20/99
Reported: 4/23/99

This laboratory report is confidential and is intended for the sole use of Del Mar Analytical and its client. This entire report was reviewed and approved for release.

CA ELAP Certificate #1197
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DEL MAR ANALYTICAL

Fred Haley
Project Manager

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Quanterra, Inc.
1721 South Grand Avenue
Santa Ana, CA 92705
Attention: Keith Aleckson

Client Project ID: E9D200206
Sample Descript: Water
First Sample #: ID02083

Sampled: 4/20/99
Received: 4/20/99
Extracted: 4/20/99
Analyzed: 4/20/99
Reported: 4/23/99

CHROMIUM VI (EPA 7196A)

Laboratory Number	Sample Description Water	Reporting Limit mg/L (ppm)	Sample Result mg/L (ppm)	QC Batch
ID02083	PTI-DI-043	0.025	N.D.	ID20C61W
ID02084	PTI-MW1S-043	0.025	N.D.	ID20C61W
ID02085	PTI-MW1D-043	0.025	N.D.	ID20C61W
ID02086	PTI-MW03-043	0.025	N.D.	ID20C61W

Analytes reported as N.D. were not present at or above the reporting limit.

DEL MAR ANALYTICAL (ELAP #1197)
Fred Haley
Project Manager

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9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (619) 505-9596 FAX (619) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (602) 785-0043 FAX (602) 785-0851

Quanterra, Inc.
1721 South Grand Avenue
Santa Ana, CA 92705
Attention: Keith Aleckson

Method Blank

Extracted: 4/20/99
Analyzed: 4/20/99
Reported: 4/23/99

CHROMIUM VI (EPA 7196A)

Laboratory Description	Reporting Limit mg/L (ppm)	Sample Result mg/L (ppm)	QC Batch
Method Blank	0.025	N.D.	ID20C61W

Analytes reported as N.D. were not present at or above the reporting limit.

DEL MAR ANALYTICAL (ELAP #1197)
Fred Haley
Project Manager

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9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (602) 785-0043 FAX (602) 785-0851

MS/MSD DATA REPORT

EPA METHOD: 7196A
Matrix: Water

Date Analyzed: 4/20/99

Sample: ID02083

Batch: ID20C61W

Analyte	R1	Sp	MS	MSD	PR1	PR2	RPD	MEAN PR	Acceptance Limits	
	mg/L	mg/L	mg/L	mg/L	%	%	%	%	RPD	MPR
Chromium VI	0	0.30	0.314	0.309	105%	103%	1.6%	104%	10	85-115

Definition of Terms:

R1 ..... Result of Sample Analysis
Sp ..... Spike Concentration Added to Sample
MS ..... Matrix Spike Result
MSD ..... Matrix Spike Duplicate Result
PR1 ..... Percent Recovery of MS; ((MS-R1) / SP) X 100
PR2 ..... Percent Recovery of MSD; ((MSD-R1) / SP) X 100
RPD ..... Relative Percent Difference; ((MS-MSD)/(MS+MSD)/2) X 100
Acceptance Limits ..... Statistically determined on an annual basis.

DEL MAR ANALYTICAL

Chain of Custody Record

E9D200206

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
CDM	Sharon Wallin	4-20-99	23192
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
19881 Von Karman Ave 11th (650)	949-757-5452 / 949 752-1307		
City / **State** / **Zip Code**	**Site Contact**		
Irvine / Ca / 92612	Ed Vigil		
Project Name	**Carrier/Waybill Number**		
PTI			
Contract/Purchase Order/Quote No.			
2279-11462-111.FLD			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis
PTI-DI-043	4-20-99	11:20	GW	3x40ml	VOA	3	HCl		X
" "				250ml	poly	1	None		X
				500ml	poly	1	HNO_3		X
MW15									← Filtered in field 24 hr hold time
PTI-~~DI~~-043	4-20-99	12:55	GW	3x40ml	VOA	3	HCl		X
" " "				250ml	poly	1	None		X
" "				500ml	poly	1	HNO_3		X
									← Filtered in field 24hr hold time
PTI-MW11D-043	4-20-99	13:45	GW	3x40ml	VOA	3	HCl		X
" "				250ml	poly	1	None		X
" "				500ml	poly	1	HNO_3		X
	DUP		DUP						← Filtered in field 24hr hold time
PTI-MW03-043	4-20-99	14:40	GW	3x40ml	VOA	3	HCl		X
				250ml	poly	1	None		X
				500ml	poly	1	HNO_3		X
									← Filtered in field 24 hour hold time
PTI-TB01-043		—	water	3x40ml	VOA	3	HCl		X

Special Instructions

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required
☒ Normal ☐ Rush

QC Level
☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Date	Time
1. Relinquished By: Todd A. Jeffery	4-20-99	14:55
2. Relinquished By: R Bartlett	4-20-99	16:06
3. Relinquished By: Cody Jeffery	4/20/99	17:05

	Date	Time
1. Received By: R Bartlett	4-20-99	1455
2. Received By: Cody Jeffery	4/20/99	1600
3. Received By: Rick Sheridan	4-20-99	1705

Comments
CC: Rick Sheridan 4-20-99 1720 Lisa M. Ondo 4/20/99 1720

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Returned to Client with Report; PINK - Field Copy

Precis
A Quanterra Product

Quanterra
1721 South Grand Ave.
Santa Ana, CA 92705

Tel (714) 258-8610
Fax (714) 258-0921

May 6, 1999

QUANTERRA INCORPORATED LOT NUMBER: E9D230261
PO/CONTRACT: 2279-11462-111.FLD

Ed Vigil
Phibro-Tech, Inc.
8851 Dice Road
Santa Fe Springs, CA 90670

Dear Mr. Vigil,

This report contains the analytical results for the nine samples received under chain of custody by Quanterra Incorporated on April 23, 1999. These samples are associated with your PTI - Santa Fe Springs project. The hexavalent chromium and pH were analyzed by a subcontract laboratory, Advance Technology Laboratories.

All applicable quality control procedures met method-specified acceptance criteria.

This report shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Diane Suzuki
Project Manager

CC: Project File

QUANTERRA INC. - SANTA ANA
PROJECT RECEIPT CHECKLIST

Date: 4/23/99

Quantims Lot #: E9D230261 Quote #: 29756

Client Name: CDM Project: PTI

Received by: R MARTIN Date/Time Received: _____

Delivered by : ☐ Client ☐ Airborne ☐ Fed Ex ☐ DHL ☐ Ultra-Ex ☑ Rey B.
☐ UPS ☐ ATD ☐ Other _____

	Initial / Date
Custody Seal Status: ☐ Intact ☐ Broken ☑ None	RW 4/23
Custody Seal #(s): ☑ No Seal #	
Sample Container(s): ☑ Quanterra ☐ Client ☐ N/A	
Temperature(s) (COOLER/BLANK) in °C: 4 - 0 (CORRECTED TEMP)	
Thermometer Used : ☑ IR (Infra-red) ☐ Digital (Probe)	
Samples: ☑ Intact ☐ Broken ☐ Other	
Anomalies: ☑ No ☐ Yes (See Clouseau)	
Labeled by	
Labeling checked by	

Short-Hold Notification: ☑ PH ☑ Wet Chem ☐ Metals (Filter/Pres) ☐ Encore ☐ N/A

Outside Analysis(es) (Test/Lab/Date Sent Out) :

pH & Cr+6 to ATC 4/23/99

********** LEAVE NO BLANK SPACES ; USE N/A **********

Fraction	1/8	-9									PH
VOAh /*	3	3									N/A
250 PB	1										N/A
500 PBn	1										<2

h:HCl s:H2SO4 na:Sodium Hydroxide znna: Sodium Hydroxide + Zinc Acetate n:HNO3 n/f:HNO3 field filtered

* Number VOA's w/ air bubbles present n/f/l:HNO3 Lab filtered

LOGGED BY/DATE: RW 4/23 REVIEWED BY/DATE: _____

PRC Ver. 4 021599

C01C116

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Laboratory/Client Sample Cross-Reference

Lab Sample ID	Client Sample ID	Date	Matrix
E9D230261-001	PTI-MW11-043	04/23/99	Water
E9D230261-002	PTI-MW06B-043	04/23/99	Water
E9D230261-003	PTI-MW06D-043	04/23/99	Water
E9D230261-004	PTI-MW07-043	04/23/99	Water
E9D230261-005	PTI-EB01-043	04/23/99	Water
E9D230261-006	PTI-MW04A-043	04/23/99	Water
E9D230261-007	PTI-MW04-043	04/23/99	Water
E9D230261-008	PTI-MW35-043	04/23/99	Water
E9D230261-009	PTI-TB02-043	04/23/99	Water

Prēcis
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Analytical Data Report

Client: PHIBRO-TECH, INC.

GC/MS Volatiles

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW11-043
Lab Sample ID: E9D230261-001

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 25
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	25	
Bromodichloromethane	ND	25	
Bromoform	ND	25	
Bromomethane	ND	50	
Carbon tetrachloride	ND	25	
Chlorobenzene	ND	25	
Dibromochloromethane	ND	25	
Chloroethane	ND	50	
Chloroform	ND	25	
Chloromethane	ND	50	
1,2-Dichlorobenzene	ND	25	
1,3-Dichlorobenzene	ND	25	
1,4-Dichlorobenzene	ND	25	
1,1-Dichloroethane	**70**	**25**	
1,2-Dichloroethane	**28**	**25**	
1,1-Dichloroethene	**29**	**25**	
cis-1,2-Dichloroethene	ND	25	
trans-1,2-Dichloroethene	ND	25	
1,2-Dichloropropane	ND	25	
cis-1,3-Dichloropropene	ND	25	
trans-1,3-Dichloropropene	ND	25	
Ethylbenzene	**1600**	**25**	
Methylene chloride	ND	25	
1,1,2,2-Tetrachloroethane	ND	25	
Tetrachloroethene	ND	25	
Toluene	**670**	**25**	
1,1,1-Trichloroethane	ND	25	
1,1,2-Trichloroethane	ND	25	
Trichloroethene	**480**	**25**	
Trichlorofluoromethane	ND	50	
Vinyl chloride	ND	50	
m-Xylene & p-Xylene	**970**	**25**	
o-Xylene	**300**	**25**	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	104	70-130	
1,2-Dichloroethane-d4	108	60-140	
Toluene-d8	98	70-130	

Précis
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Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW06B-043
Lab Sample ID: E9D230261-002

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	**2.3**	**1.0**	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	**1.5**	**1.0**	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**42**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**1.6**	**1.0**	
Toluene	**19**	**1.0**	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**31**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	**26**	**1.0**	
o-Xylene	**7.9**	**1.0**	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	103	70-130	
1,2-Dichloroethane-d4	106	60-140	
Toluene-d8	96	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW06D-043
Lab Sample ID: E9D230261-003

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**14**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**1.2**	**1.0**	
Toluene	**4.0**	**1.0**	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**10**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	**8.9**	**1.0**	
o-Xylene	**2.6**	**1.0**	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	99	70-130	
1,2-Dichloroethane-d4	104	60-140	
Toluene-d8	94	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW07-043
Lab Sample ID: E9D230261-004

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 2
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	2.0	
Bromodichloromethane	ND	2.0	
Bromoform	ND	2.0	
Bromomethane	ND	4.0	
Carbon tetrachloride	ND	2.0	
Chlorobenzene	ND	2.0	
Dibromochloromethane	ND	2.0	
Chloroethane	ND	4.0	
Chloroform	ND	2.0	
Chloromethane	ND	4.0	
1,2-Dichlorobenzene	ND	2.0	
1,3-Dichlorobenzene	ND	2.0	
1,4-Dichlorobenzene	ND	2.0	
1,1-Dichloroethane	**33**	**2.0**	
1,2-Dichloroethane	**9.7**	**2.0**	
1,1-Dichloroethene	**8.4**	**2.0**	
cis-1,2-Dichloroethene	**22**	**2.0**	
trans-1,2-Dichloroethene	**2.7**	**2.0**	
1,2-Dichloropropane	ND	2.0	
cis-1,3-Dichloropropene	ND	2.0	
trans-1,3-Dichloropropene	ND	2.0	
Ethylbenzene	**11**	**2.0**	
Methylene chloride	ND	2.0	
1,1,2,2-Tetrachloroethane	ND	2.0	
Tetrachloroethene	ND	2.0	
Toluene	**3.0**	**2.0**	
1,1,1-Trichloroethane	ND	2.0	
1,1,2-Trichloroethane	ND	2.0	
Trichloroethene	**80**	**2.0**	
Trichlorofluoromethane	ND	4.0	
Vinyl chloride	ND	4.0	
m-Xylene & p-Xylene	**6.8**	**2.0**	
o-Xylene	ND	2.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	112	70-130	
1,2-Dichloroethane-d4	113	60-140	
Toluene-d8	110	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-EB01-043
Lab Sample ID: E9D230261-005

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	ND	1.0	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	99	70-130	
1,2-Dichloroethane-d4	104	60-140	
Toluene-d8	95	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW04A-043
Lab Sample ID: E9D230261-006

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	**2.7**	**1.0**	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**2.9**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**1.5**	**1.0**	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**7.0**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	**1.7**	**1.0**	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	101	70-130	
1,2-Dichloroethane-d4	108	60-140	
Toluene-d8	98	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW04-043
Lab Sample ID: E9D230261-007

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 2.5
Method: 8260B
Preparation: 5030B/8260B

Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	**3.5**	**2.5**	
Bromodichloromethane	ND	2.5	
Bromoform	ND	2.5	
Bromomethane	ND	5.0	
Carbon tetrachloride	ND	2.5	
Chlorobenzene	ND	2.5	
Dibromochloromethane	ND	2.5	
Chloroethane	ND	5.0	
Chloroform	**10**	**2.5**	
Chloromethane	ND	5.0	
1,2-Dichlorobenzene	ND	2.5	
1,3-Dichlorobenzene	ND	2.5	
1,4-Dichlorobenzene	ND	2.5	
1,1-Dichloroethane	**64**	**2.5**	
1,2-Dichloroethane	**66**	**2.5**	
1,1-Dichloroethene	**40**	**2.5**	
cis-1,2-Dichloroethene	**68**	**2.5**	
trans-1,2-Dichloroethene	ND	2.5	
1,2-Dichloropropane	ND	2.5	
cis-1,3-Dichloropropene	ND	2.5	
trans-1,3-Dichloropropene	ND	2.5	
Ethylbenzene	**220**	**2.5**	
Methylene chloride	**36**	**2.5**	
1,1,2,2-Tetrachloroethane	ND	2.5	
Tetrachloroethene	ND	2.5	
Toluene	ND	2.5	
1,1,1-Trichloroethane	ND	2.5	
1,1,2-Trichloroethane	ND	2.5	
Trichloroethene	**190**	**2.5**	
Trichlorofluoromethane	ND	5.0	
Vinyl chloride	ND	5.0	
m-Xylene & p-Xylene	**9.9**	**2.5**	
o-Xylene	ND	2.5	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	110	70-130	
1,2-Dichloroethane-d4	125	60-140	
Toluene-d8	101	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW35-043
Lab Sample ID: E9D230261-008

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 2.5
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	**3.6**	**2.5**	
Bromodichloromethane	ND	2.5	
Bromoform	ND	2.5	
Bromomethane	ND	5.0	
Carbon tetrachloride	ND	2.5	
Chlorobenzene	ND	2.5	
Dibromochloromethane	ND	2.5	
Chloroethane	ND	5.0	
Chloroform	**10**	**2.5**	
Chloromethane	ND	5.0	
1,2-Dichlorobenzene	ND	2.5	
1,3-Dichlorobenzene	ND	2.5	
1,4-Dichlorobenzene	ND	2.5	
1,1-Dichloroethane	**66**	**2.5**	
1,2-Dichloroethane	**68**	**2.5**	
1,1-Dichloroethene	**43**	**2.5**	
cis-1,2-Dichloroethene	**68**	**2.5**	
trans-1,2-Dichloroethene	ND	2.5	
1,2-Dichloropropane	ND	2.5	
cis-1,3-Dichloropropene	ND	2.5	
trans-1,3-Dichloropropene	ND	2.5	
Ethylbenzene	**230**	**2.5**	
Methylene chloride	**37**	**2.5**	
1,1,2,2-Tetrachloroethane	ND	2.5	
Tetrachloroethene	ND	2.5	
Toluene	ND	2.5	
1,1,1-Trichloroethane	ND	2.5	
1,1,2-Trichloroethane	ND	2.5	
Trichloroethene	**190**	**2.5**	
Trichlorofluoromethane	ND	5.0	
Vinyl chloride	ND	5.0	
m-Xylene & p-Xylene	**7.5**	**2.5**	
o-Xylene	ND	2.5	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	110	70-130	
1,2-Dichloroethane-d4	125	60-140	
Toluene-d8	101	70-130	

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Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-TB02-043
Lab Sample ID: E9D230261-009

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9115173
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/23/99
Date Prepared: 04/24/99
Date Analyzed: 04/24/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	ND	1.0	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	96	70-130	
1,2-Dichloroethane-d4	106	60-140	
Toluene-d8	95	70-130	

Prēcis
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Analytical Data Report

Client: PHIBRO-TECH, INC.

Metals

Précis
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Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW11-043
Lab Sample ID: E9D230261-001

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW06B-043
Lab Sample ID: E9D230261-002

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW06D-043
Lab Sample ID: E9D230261-003

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

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Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW07-043
Lab Sample ID: E9D230261-004

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	**0.042**	**0.025**	**1**	

Client Sample ID: PTI-EB01-043
Lab Sample ID: E9D230261-005

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW04A-043
Lab Sample ID: E9D230261-006

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	**0.012**	**0.010**	**1**	
Copper	ND	0.025	1	

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Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW04-043
Lab Sample ID: E9D230261-007

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L

Method: 6010B
Preparation: 3005A

Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	**0.41**	**0.010**	**2**	
Chromium	**42.8**	**0.020**	**2**	
Copper	ND	0.050	2	

Client Sample ID: PTI-MW35-043
Lab Sample ID: E9D230261-008

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9116282
Matrix: Water
Units: mg/L

Method: 6010B
Preparation: 3005A

Date Sampled: 04/23/99
Date Prepared: 04/26/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	**0.42**	**0.010**	**2**	
Chromium	**43.4**	**0.020**	**2**	
Copper	ND	0.050	2	

Quality Control Batch Assignment Report

Lab Sample ID	Matrix	Method	Batch ID	MS Run Number
Metals				
E9D230261-001	WATER	6010B	9116282	9116121
E9D230261-002	WATER	6010B	9116282	9116121
E9D230261-003	WATER	6010B	9116282	9116121
E9D230261-004	WATER	6010B	9116282	9116121
E9D230261-005	WATER	6010B	9116282	9116121
E9D230261-006	WATER	6010B	9116282	9116121
E9D230261-007	WATER	6010B	9116282	9116121
E9D230261-008	WATER	6010B	9116282	9116121
GC/MS Volatiles				
E9D230248-017	WATER	8260B	9115173	9115033
E9D230261-001	WATER	8260B	9115173	9115033
E9D230261-002	WATER	8260B	9115173	9115033
E9D230261-003	WATER	8260B	9115173	9115033
E9D230261-004	WATER	8260B	9115173	9115033
E9D230261-005	WATER	8260B	9115173	9115033
E9D230261-006	WATER	8260B	9115173	9115033
E9D230261-007	WATER	8260B	9115173	9115033
E9D230261-008	WATER	8260B	9115173	9115033
E9D230261-009	WATER	8260B	9115173	9115033

GC/MS Volatiles

Batch ID: 9115173

Volatile Organics, GC/MS (8260B)

Method Blank

Lab Sample ID: E9D250000-173B
Matrix: Water
Units: ug/L

Analyte	Result	RL	Qual.	Date Analyzed
Benzene	ND	1.0		04/24/99
Bromodichloromethane	ND	1.0		04/24/99
Bromoform	ND	1.0		04/24/99
Bromomethane	ND	2.0		04/24/99
Carbon tetrachloride	ND	1.0		04/24/99
Chlorobenzene	ND	1.0		04/24/99
Dibromochloromethane	ND	1.0		04/24/99
Chloroethane	ND	2.0		04/24/99
Chloroform	ND	1.0		04/24/99
Chloromethane	ND	2.0		04/24/99
1,2-Dichlorobenzene	ND	1.0		04/24/99
1,3-Dichlorobenzene	ND	1.0		04/24/99
1,4-Dichlorobenzene	ND	1.0		04/24/99
1,1-Dichloroethane	ND	1.0		04/24/99
1,2-Dichloroethane	ND	1.0		04/24/99
1,1-Dichloroethene	ND	1.0		04/24/99
cis-1,2-Dichloroethene	ND	1.0		04/24/99
trans-1,2-Dichloroethene	ND	1.0		04/24/99
1,2-Dichloropropane	ND	1.0		04/24/99
cis-1,3-Dichloropropene	ND	1.0		04/24/99
trans-1,3-Dichloropropene	ND	1.0		04/24/99
Ethylbenzene	ND	1.0		04/24/99
Methylene chloride	ND	1.0		04/24/99
1,1,2,2-Tetrachloroethane	ND	1.0		04/24/99
Tetrachloroethene	ND	1.0		04/24/99
Toluene	ND	1.0		04/24/99
1,1,1-Trichloroethane	ND	1.0		04/24/99
1,1,2-Trichloroethane	ND	1.0		04/24/99
Trichloroethene	ND	1.0		04/24/99
Trichlorofluoromethane	ND	2.0		04/24/99
Vinyl chloride	ND	2.0		04/24/99
m-Xylene & p-Xylene	ND	1.0		04/24/99
o-Xylene	ND	1.0		04/24/99

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	98	70-130	
1,2-Dichloroethane-d4	108	60-140	
Toluene-d8	98	70-130	

Batch ID: 9115173

Volatile Organics, GC/MS (8260B)

Laboratory Control Sample

Lab Sample ID: E9D250000-173C
Matrix: Water
Units: ug/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Benzene	10.0	9.43	94	70-130	
Chlorobenzene	10.0	9.95	100	70-130	
1,1-Dichloroethene	10.0	9.38	94	60-140	
Toluene	10.0	9.52	95	70-130	
Trichloroethene	10.0	11.4	114	70-130	
Surrogate					
Bromofluorobenzene	10.0	10.4	104	70-130	
1,2-Dichloroethane-d4	10.0	10.7	107	60-140	
Toluene-d8	10.0	9.82	98	70-130	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D230248-017S
Matrix: Water
Units: ug/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Benzene	ND	10.0	9.03	9.27	90	93	70-130	2.6		
Chlorobenzene	ND	10.0	9.65	9.96	96	100	70-130	3.2		
1,1-Dichloroethene	ND	10.0	9.26	9.48	93	95	60-140	2.3		
Toluene	ND	10.0	9.26	9.47	93	95	70-130	2.2		
Trichloroethene	ND	10.0	12.2	12.2	113	113	70-130	0.40		
Surrogate										
Bromofluorobenzene	9.9	10.0	10.9	11.1	109	111	70-130			
1,2-Dichloroethane-d4	11	10.0	11.3	11.5	113	115	60-140			
Toluene-d8	9.4	10.0	9.92	10.3	99	103	70-130			

Metals

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Quality Control Reports

Batch ID: 9116282

Inductively Coupled Plasma (6010B)

Method Blank

Lab Sample ID: E9D260000-282B
Matrix: Water
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
Cadmium	ND	0.0050		04/28/99
Chromium	ND	0.010		04/28/99
Copper	ND	0.025		04/28/99

Laboratory Control Sample

Lab Sample ID: E9D260000-282C
Matrix: Water
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Cadmium	0.0500	0.0502	100	80-120	
Chromium	0.200	0.206	103	80-120	
Copper	0.250	0.242	97	80-120	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D230261-001S
Matrix: Water
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Cadmium	ND	0.0500	0.0453	0.0445	91	89	80-120	1.8		
Chromium	ND	0.200	0.187	0.184	92	91	80-120	1.5		
Copper	ND	0.250	0.248	0.239	99	96	80-120	3.5		

Quanterra
Environmental
Services
Précis Product

Subcontract Analyses

Classical Chemistry

May 29, 1997 ELAP No.: 1838

Quanterra Environmental Services
1721 South Grand Avenue
Santa Ana, CA 92705

ATTN: Sharon Meves

Client's Project: PTI, #2279-11462-111, FLD
Lab No.: 35710-001/008

Enclosed are the results for sample(s) received by Advanced Technology Laboratories and tested for the parameters indicated in the enclosed chain of custody.

Thank you for the opportunity to service the needs of your company. Please feel free to call me at (562) 989 - 4045 if I can be of further assistance to your company.

Sincerely,

Cheryl de los Reyes
Technical Operations Manager
CDR/jh

Enclosures

This cover letter is an integral part of this analytical report.

This report pertains only to the samples investigated and does not necessarily apply to other apparently identical or similar materials. This report is submitted for the exclusive use of the client to whom it is addressed. Any reproduction of this report or use of this Laboratory's name for advertising or publicity purpose without authorization is prohibited.

Spike Recovery and RPD Summary Report

Method: EPA 7196A
Analyst: NS/CM
Data File: 9113-1W

Date: 04/23/99
Sample ID: BLANK
Matrix: Water
QC Batch: CR6+990423W-1

ANALYTE	UNITS	LCS Conc	LCS Res	% Rec	METH BL	SPL CONC	SPK ADDED	MS RSLT	MSD RSLT	%MS REC	MSD RE	REC Limit	RPD	PD Lim	MDL
Hex Chrome	mg/L	0.50	0.54	108	ND	ND	0.50	0.46	0.47	92	94	80-120	2	20	0.01

Approved by: _____
Liping Liu
Inorganics Supervisor

Date: 4/23/99

Advanced Technology

Client: Quanterra Environmental Services
Attn: Sharon Wallin

Client's Project PTI, #2279-11462-111, FLD

Date Received: 04/23/99
Date Sampled: 04/23/99

Lab No.	Sample I.D.	Analysis	Date Analyzed	Results	Matrix, Units	MDL	DLR	Analyst
35170-001	PTI-MW11-043	EPA 7196A (Hexavalent Chromium)	04/23/99	ND	Water, mg/L	0.01	0.01	NS/CM
35170-002	PTI-MW06B-043	EPA 7196A (Hexavalent Chromium)	04/23/99	ND	Water, mg/L	0.01	0.01	NS/CM
35170-003	PTI-MW06D-043	EPA 7196A (Hexavalent Chromium)	04/23/99	ND	Water, mg/L	0.01	0.01	NS/CM
35170-004	PTI-MW07-043	EPA 7196A (Hexavalent Chromium)	04/23/99	ND	Water, mg/L	0.01	0.01	NS/CM
35170-005	PTI-EB01-043	EPA 7196A (Hexavalent Chromium)	04/23/99	ND	Water, mg/L	0.01	0.01	NS/CM
35170-006	PTI-MW04A-043	EPA 7196A (Hexavalent Chromium)	04/23/99	ND	Water, mg/L	0.01	0.01	NS/CM
35170-007	PTI-MW04-043	EPA 7196A (Hexavalent Chromium)	04/23/99	0.57	Water, mg/L	0.01	0.01	NS/CM
35170-008	PTI-MW35-043	EPA 7196A (Hexavalent Chromium)	04/23/99	4.6	Water, mg/L	0.01	0.5	NS/CM
35170-001	PTI-MW11-043	EPA 150.1 (pH)	04/23/99	6.83	Water, pH units	---	---	RAL
35170-002	PTI-MW06B-043	EPA 150.1 (pH)	04/23/99	7.01	Water, pH units	---	---	RAL
35170-003	PTI-MW06D-043	EPA 150.1 (pH)	04/23/99	7.26	Water, pH units	---	---	RAL
35170-004	PTI-MW07-043	EPA 150.1 (pH)	04/23/99	6.81	Water, pH units	---	---	RAL
35170-005	PTI-EB01-043	EPA 150.1 (pH)	04/23/99	8.22	Water, pH units	---	---	RAL
35170-006	PTI-MW04A-043	EPA 150.1 (pH)	04/23/99	7.54	Water, pH units	---	---	RAL
35170-007	PTI-MW04-043	EPA 150.1 (pH)	04/23/99	6.70	Water, pH units	---	---	RAL
35170-008	PTI-MW35-043	EPA 150.1 (pH)	04/23/99	6.61	Water, pH units	---	---	RAL

MDL = Method Detection Limit
ND = Not Detected (Below DLR)
DF = Dilution Factor (DLR/MDL)

Reviewed/Approved By: _____ **Date:** 4/26/99
Cheryl de los Reyes
Technical Operations Manager

The cover letter is an integral part of this analytical report.

Advanced Technology Laboratories
1510 E. 33rd Street Signal Hill, CA 90807 Tel: 562 989-4045 Fax: 562 989-4040

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
CDM	Sharon Walker	4-23-99	22779
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
18881 Von Karman			
City / **State** / **Zip Code**	**Site Contact**		
Irvine / CA / 92612			
Project Name	**Carrier/Waybill Number**		
PTI			
Contract/Purchase Order/Quote No.			
2279-11462-111.FLD			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: Cr6	Analysis: pH
PTI-MW11-043	4-23-99	0905	GW						✓	✓
PTI-MW06B-043		1015	GW						✓	✓
PTI-MW06D-043		1110							✓	✓
PTI-MW07-043		1230							✓	✓
PTI-EB01-043		1044							✓	✓
PTI-MW04A-043		1420							✓	✓
PTI-MW04-043		1520							✓	✓
PTI-MW35-043		1310							✓	✓
~~PTI~~ dr										

Special Instructions Please send results to Quanterra 17215 Grand Ave, Santa Ana, CA 92705 Attn Diane Suzuki (714) 258-8610

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required
☑ Normal ☐ Rush

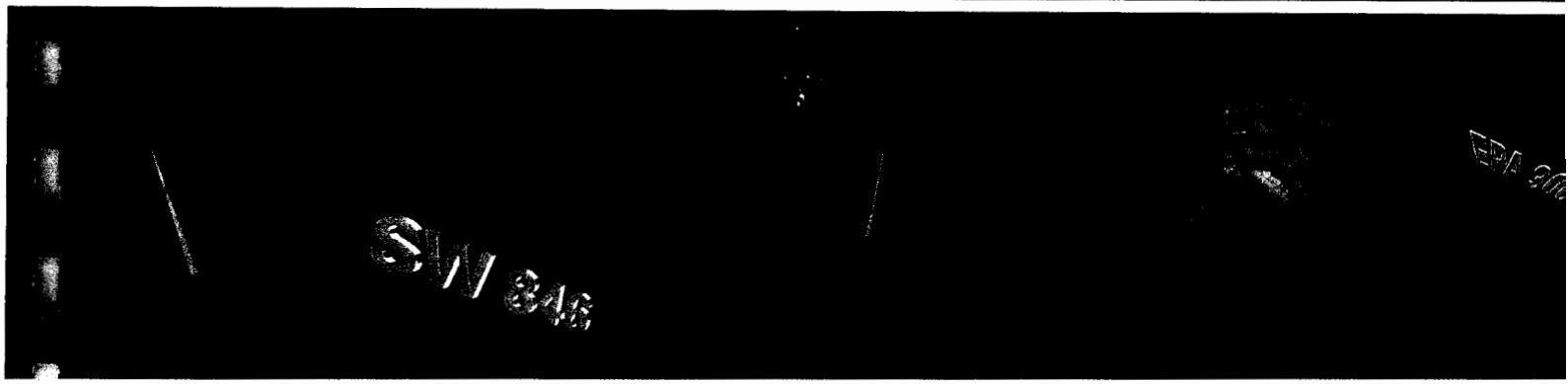
QC Level
☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.		4-23-99			4/23/99	18:50
2.						
3.						

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy



Precis
A Quanterra Product

Quanterra
1721 South Grand Ave.
Santa Ana, CA 92705

Tel (714) 258-8610
Fax (714) 258-0921

May 27, 1999

QUANTERRA INCORPORATED PROJECT NUMBER: E9D260205r
PO/CONTRACT: 2279-11462-111.FLD

Ed Vigil
Phibro Tech, Inc.
8851 Dice Road
Santa Fe Springs, CA 90670

Dear Mr. Vigil,

This report contains the analytical results for the 8 samples received under chain of custody by Quanterra Incorporated on 04/26/1999. These samples are associated with your PTI - Santa Fe Springs project.

Please note that the Hexavalent Chromium and pH were analyzed at a subcontract laboratory, Advance Technology Laboratories.

All applicable quality control procedures met method-specified acceptance criteria.

This report has been revised to reflect the corrected sample id and shall not be reproduced except in full, without the written approval of the laboratory.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Diane Suzuki
Project Manager

CC: Sharon Wallin, Camp, Dresser, McKee, Irvine

QUANTERRA INC. - SANTA ANA
PROJECT RECEIPT CHECKLIST

Date: 4/26/99

Quantims Lot #: E9D260205 Quote #: 29256

Client Name: CDM Project: PTT L

Received by: RUMANIAN Date/Time Received: 4/26 1730

Delivered by : ☐Client ☐Airborne ☐Fed Ex ☐DHL ☐Ultra-Ex ☑Rey B.
☐UPS ☐ATD ☐Other _____

	Initial / Date
Custody Seal Status: ☐Intact ☐Broken ☑None	RM 4/26
Custody Seal #(s): ☑No Seal #	
Sample Container(s): ☑Quanterra ☐Client ☐N/A	
Temperature(s) (COOLER/BLANK) in °C: 4.0 (CORRECTED TEMP)	
Thermometer Used : ☑IR (Infra-red) ☐Digital (Probe)	
Samples: ☑Intact ☐Broken ☐Other	
Anomalies: ☑No ☐Yes (See Clouseau)	
Labeled by	
Labeling checked by	

Short-Hold Notification: ☐Ph ☐Wet Chem ☐Metals (Filter/Pres) ☐Encore ☑N/A

Outside Analysis(es) (Test/Lab/Date Sent Out) :

pH & Cr+6 to ATL
CE9D26020

✓

********** LEAVE NO BLANK SPACES ; USE N/A **********

Fraction	1/7	-8									PH
VOAh /*	3	3									N/A
500Bn	1										<2

h:HCl s:H2SO4 na:Sodium Hydroxide znna: Sodium Hydroxide + Zinc Acetate n:HNO3 n/f:HNO3 field filtered
* Number VOA's w/ air bubbles present n/f/l:HNO3 Lab filtered

LOGGED BY/DATE: RM 4/26/99 REVIEWED BY/DATE: _____

PRC Ver. 4 021599

C010125

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Laboratory/Client Sample Cross-Reference

Lab Sample ID	Client Sample ID	Date	Matrix
E9D260205-001	PTI-MW14S-043	04/26/99	Water
E9D260205-002	PTI-MW15S-043	04/26/99	Water
E9D260205-003	PTI-MW15D-043	04/26/99	Water
E9D260205-004	PTI-MW16-043	04/26/99	Water
E9D260205-005	PTI-EB02-043	04/26/99	Water
E9D260205-006	PTI-MW09-043	04/26/99	Water
E9D260205-007	PTI-MW37-043	04/26/99	Water
E9D260205-008	PTI-TB03-043	04/26/99	Water

Prēcis
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Analytical Data Report

Client: PHIBRO-TECH, INC.

GC/MS Volatiles

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW14S-043
Lab Sample ID: E9D260205-001

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 12.5
Method: 8260B
Preparation: 5030B/8260B

Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/30/99

Analyte	Result	RL	Qualifier
Benzene	ND	12	
Bromodichloromethane	ND	12	
Bromoform	ND	12	
Bromomethane	ND	25	
Carbon tetrachloride	**25**	**12**	
Chlorobenzene	ND	12	
Dibromochloromethane	ND	12	
Chloroethane	ND	25	
Chloroform	**18**	**12**	
Chloromethane	ND	25	
1,2-Dichlorobenzene	ND	12	
1,3-Dichlorobenzene	ND	12	
1,4-Dichlorobenzene	ND	12	
1,1-Dichloroethane	**30**	**12**	
1,2-Dichloroethane	**20**	**12**	
1,1-Dichloroethene	**22**	**12**	
cis-1,2-Dichloroethene	ND	12	
trans-1,2-Dichloroethene	ND	12	
1,2-Dichloropropane	ND	12	
cis-1,3-Dichloropropene	ND	12	
trans-1,3-Dichloropropene	ND	12	
Ethylbenzene	**820**	**12**	
Methylene chloride	ND	12	
1,1,2,2-Tetrachloroethane	ND	12	
Tetrachloroethene	ND	12	
Toluene	ND	12	
1,1,1-Trichloroethane	ND	12	
1,1,2-Trichloroethane	ND	12	
Trichloroethene	**84**	**12**	
Trichlorofluoromethane	ND	25	
Vinyl chloride	ND	25	
m-Xylene & p-Xylene	**34**	**12**	
o-Xylene	**13**	**12**	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	102	70-130	
1,2-Dichloroethane-d4	114	60-140	
Toluene-d8	97	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW15S-043
Lab Sample ID: E9D260205-002

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/30/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	**1.7**	**1.0**	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	**2.9**	**1.0**	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	**75**	**1.0**	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**23**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**1.3**	**1.0**	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**4.2**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	**2.2**	**1.0**	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	102	70-130	
1,2-Dichloroethane-d4	100	60-140	
Toluene-d8	100	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW15D-043
Lab Sample ID: E9D260205-003

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/30/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	**2.3**	**1.0**	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	**12**	**1.0**	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	**13**	**1.0**	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	**25**	**1.0**	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	**1.6**	**1.0**	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	106	70-130	
1,2-Dichloroethane-d4	121	60-140	
Toluene-d8	103	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW16-043
Lab Sample ID: E9D260205-004

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121153
Matrix: Water
Units: ug/L
Dil. Factor: 2
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/30/99
Date Analyzed: 04/30/99

Analyte	Result	RL	Qualifier
Benzene	ND	2.0	
Bromodichloromethane	ND	2.0	
Bromoform	ND	2.0	
Bromomethane	ND	4.0	
Carbon tetrachloride	ND	2.0	
Chlorobenzene	ND	2.0	
Dibromochloromethane	ND	2.0	
Chloroethane	ND	4.0	
Chloroform	ND	2.0	
Chloromethane	ND	4.0	
1,2-Dichlorobenzene	ND	2.0	
1,3-Dichlorobenzene	ND	2.0	
1,4-Dichlorobenzene	ND	2.0	
1,1-Dichloroethane	**180**	**2.0**	
1,2-Dichloroethane	**41**	**2.0**	
1,1-Dichloroethene	**20**	**2.0**	
cis-1,2-Dichloroethene	**13**	**2.0**	
trans-1,2-Dichloroethene	**3.4**	**2.0**	
1,2-Dichloropropane	ND	2.0	
cis-1,3-Dichloropropene	ND	2.0	
trans-1,3-Dichloropropene	ND	2.0	
Ethylbenzene	**6.1**	**2.0**	
Methylene chloride	ND	2.0	
1,1,2,2-Tetrachloroethane	ND	2.0	
Tetrachloroethene	ND	2.0	
Toluene	ND	2.0	
1,1,1-Trichloroethane	ND	2.0	
1,1,2-Trichloroethane	ND	2.0	
Trichloroethene	**39**	**2.0**	
Trichlorofluoromethane	ND	4.0	
Vinyl chloride	ND	4.0	
m-Xylene & p-Xylene	ND	2.0	
o-Xylene	ND	2.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	106	70-130	
1,2-Dichloroethane-d4	134	60-140	
Toluene-d8	96	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-EB02-043
Lab Sample ID: E9D260205-005

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/29/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	ND	1.0	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	100	70-130	
1,2-Dichloroethane-d4	107	60-140	
Toluene-d8	100	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW09-043
Lab Sample ID: E9D260205-006

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 5
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/30/99

Analyte	Result	RL	Qualifier
Benzene	ND	5.0	
Bromodichloromethane	ND	5.0	
Bromoform	ND	5.0	
Bromomethane	ND	10	
Carbon tetrachloride	ND	5.0	
Chlorobenzene	ND	5.0	
Dibromochloromethane	ND	5.0	
Chloroethane	ND	10	
Chloroform	**160**	**5.0**	
Chloromethane	ND	10	
1,2-Dichlorobenzene	ND	5.0	
1,3-Dichlorobenzene	ND	5.0	
1,4-Dichlorobenzene	ND	5.0	
1,1-Dichloroethane	**250**	**5.0**	
1,2-Dichloroethane	**180**	**5.0**	
1,1-Dichloroethene	**68**	**5.0**	
cis-1,2-Dichloroethene	**16**	**5.0**	
trans-1,2-Dichloroethene	ND	5.0	
1,2-Dichloropropane	ND	5.0	
cis-1,3-Dichloropropene	ND	5.0	
trans-1,3-Dichloropropene	ND	5.0	
Ethylbenzene	ND	5.0	
Methylene chloride	**200**	**5.0**	
1,1,2,2-Tetrachloroethane	ND	5.0	
Tetrachloroethene	**7.0**	**5.0**	
Toluene	ND	5.0	
1,1,1-Trichloroethane	**16**	**5.0**	
1,1,2-Trichloroethane	**5.0**	**5.0**	
Trichloroethene	**350**	**5.0**	
Trichlorofluoromethane	ND	10	
Vinyl chloride	ND	10	
m-Xylene & p-Xylene	ND	5.0	
o-Xylene	ND	5.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	102	70-130	
1,2-Dichloroethane-d4	132	60-140	
Toluene-d8	100	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW37-043
Lab Sample ID: E9D260205-007

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 5
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/30/99

Analyte	Result	RL	Qualifier
Benzene	ND	5.0	
Bromodichloromethane	ND	5.0	
Bromoform	ND	5.0	
Bromomethane	ND	10	
Carbon tetrachloride	ND	5.0	
Chlorobenzene	ND	5.0	
Dibromochloromethane	ND	5.0	
Chloroethane	ND	10	
Chloroform	**110**	**5.0**	
Chloromethane	ND	10	
1,2-Dichlorobenzene	ND	5.0	
1,3-Dichlorobenzene	ND	5.0	
1,4-Dichlorobenzene	ND	5.0	
1,1-Dichloroethane	**170**	**5.0**	
1,2-Dichloroethane	**170**	**5.0**	
1,1-Dichloroethene	**47**	**5.0**	
cis-1,2-Dichloroethene	**10**	**5.0**	
trans-1,2-Dichloroethene	ND	5.0	
1,2-Dichloropropane	ND	5.0	
cis-1,3-Dichloropropene	ND	5.0	
trans-1,3-Dichloropropene	ND	5.0	
Ethylbenzene	ND	5.0	
Methylene chloride	**130**	**5.0**	
1,1,2,2-Tetrachloroethane	ND	5.0	
Tetrachloroethene	ND	5.0	
Toluene	ND	5.0	
1,1,1-Trichloroethane	**9.8**	**5.0**	
1,1,2-Trichloroethane	ND	5.0	
Trichloroethene	**250**	**5.0**	
Trichlorofluoromethane	ND	10	
Vinyl chloride	ND	10	
m-Xylene & p-Xylene	ND	5.0	
o-Xylene	ND	5.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	101	70-130	
1,2-Dichloroethane-d4	130	60-140	
Toluene-d8	99	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-TB03-043
Lab Sample ID: E9D260205-008

Volatile Organics, GC/MS (8260B)
25 mL Purge-and-Trap

Batch: 9121102
Matrix: Water
Units: ug/L
Dil. Factor: 1
Method: 8260B
Preparation: 5030B/8260B
Date Sampled: 04/26/99
Date Prepared: 04/29/99
Date Analyzed: 04/29/99

Analyte	Result	RL	Qualifier
Benzene	ND	1.0	
Bromodichloromethane	ND	1.0	
Bromoform	ND	1.0	
Bromomethane	ND	2.0	
Carbon tetrachloride	ND	1.0	
Chlorobenzene	ND	1.0	
Dibromochloromethane	ND	1.0	
Chloroethane	ND	2.0	
Chloroform	ND	1.0	
Chloromethane	ND	2.0	
1,2-Dichlorobenzene	ND	1.0	
1,3-Dichlorobenzene	ND	1.0	
1,4-Dichlorobenzene	ND	1.0	
1,1-Dichloroethane	ND	1.0	
1,2-Dichloroethane	ND	1.0	
1,1-Dichloroethene	ND	1.0	
cis-1,2-Dichloroethene	ND	1.0	
trans-1,2-Dichloroethene	ND	1.0	
1,2-Dichloropropane	ND	1.0	
cis-1,3-Dichloropropene	ND	1.0	
trans-1,3-Dichloropropene	ND	1.0	
Ethylbenzene	ND	1.0	
Methylene chloride	ND	1.0	
1,1,2,2-Tetrachloroethane	ND	1.0	
Tetrachloroethene	ND	1.0	
Toluene	ND	1.0	
1,1,1-Trichloroethane	ND	1.0	
1,1,2-Trichloroethane	ND	1.0	
Trichloroethene	ND	1.0	
Trichlorofluoromethane	ND	2.0	
Vinyl chloride	ND	2.0	
m-Xylene & p-Xylene	ND	1.0	
o-Xylene	ND	1.0	

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	96	70-130	
1,2-Dichloroethane-d4	101	60-140	
Toluene-d8	100	70-130	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Metals

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW14S-043
Lab Sample ID: E9D260205-001

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW15S-043
Lab Sample ID: E9D260205-002

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	**0.013**	**0.010**	**1**	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW15D-043
Lab Sample ID: E9D260205-003

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	**0.035**	**0.010**	**1**	
Copper	ND	0.025	1	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW16-043
Lab Sample ID: E9D260205-004

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-EB02-043
Lab Sample ID: E9D260205-005

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	ND	0.010	1	
Copper	ND	0.025	1	

Client Sample ID: PTI-MW09-043
Lab Sample ID: E9D260205-006

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L
Method: 6010B
Preparation: 3005A
Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	**0.64**	**0.010**	**1**	
Copper	ND	0.025	1	

Précis
A Quanterra Product

Analytical Data Report

Client: PHIBRO-TECH, INC.

Client Sample ID: PTI-MW37-043
Lab Sample ID: E9D260205-007

Inductively Coupled Plasma (6010B)
Acid Digestion for Total Recoverable Metals

Batch: 9117291
Matrix: Water
Units: mg/L

Method: 6010B
Preparation: 3005A

Date Sampled: 04/26/99
Date Prepared: 04/27/99
Date Analyzed: 04/28/99

Analyte	Result	RL	Dil. Factor	Qualifier
Cadmium	ND	0.0050	1	
Chromium	**0.60**	**0.010**	**1**	
Copper	ND	0.025	1	

Quality Control Batch Assignment Report

Lab Sample ID	Matrix	Method	Batch ID	MS Run Number
Metals				
E9D260205-001	WATER	6010B	9117291	9117118
E9D260205-002	WATER	6010B	9117291	9117118
E9D260205-003	WATER	6010B	9117291	9117118
E9D260205-004	WATER	6010B	9117291	9117118
E9D260205-005	WATER	6010B	9117291	9117118
E9D260205-006	WATER	6010B	9117291	9117118
E9D260205-007	WATER	6010B	9117291	9117118
GC/MS Volatiles				
E9D260205-001	WATER	8260B	9121102	9121003
E9D260205-002	WATER	8260B	9121102	9121003
E9D260205-003	WATER	8260B	9121102	9121003
E9D260205-004	WATER	8260B	9121153	9121036
E9D260205-005	WATER	8260B	9121102	9121003
E9D260205-006	WATER	8260B	9121102	9121003
E9D260205-007	WATER	8260B	9121102	9121003
E9D260205-008	WATER	8260B	9121102	9121003
E9D270200-001	WATER	8260B	9121102	9121003
E9D300167-002	WATER	8260B	9121153	9121036

Metals

Précis
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Quality Control Reports

Batch ID: 9117291

Inductively Coupled Plasma (6010B)

Method Blank

Lab Sample ID: E9D270000-291B
Matrix: Water
Units: mg/L

Analyte	Result	RL	Qual.	Date Analyzed
Cadmium	ND	0.0050		04/28/99
Chromium	ND	0.010		04/28/99
Copper	ND	0.025		04/28/99

Laboratory Control Sample

Lab Sample ID: E9D270000-291C
Matrix: Water
Units: mg/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Cadmium	0.0500	0.0493	99	80-120	
Chromium	0.200	0.204	102	80-120	
Copper	0.250	0.240	96	80-120	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D260205-001S
Matrix: Water
Units: mg/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Cadmium	ND	0.0500	0.0511	0.0508	102	102	80-120	0.49		
Chromium	ND	0.200	0.214	0.216	103	104	80-120	0.97		
Copper	ND	0.250	0.295	0.298	109	110	80-120	0.77		

GC/MS Volatiles

Batch ID: 9121102

Volatile Organics, GC/MS (8260B)

Method Blank

Lab Sample ID: E9E010000-102B
Matrix: Water
Units: ug/L

Analyte	Result	RL	Qual.	Date Analyzed
Benzene	ND	1.0		04/29/99
Bromodichloromethane	ND	1.0		04/29/99
Bromoform	ND	1.0		04/29/99
Bromomethane	ND	2.0		04/29/99
Carbon tetrachloride	ND	1.0		04/29/99
Chlorobenzene	ND	1.0		04/29/99
Dibromochloromethane	ND	1.0		04/29/99
Chloroethane	ND	2.0		04/29/99
Chloroform	ND	1.0		04/29/99
Chloromethane	ND	2.0		04/29/99
1,2-Dichlorobenzene	ND	1.0		04/29/99
1,3-Dichlorobenzene	ND	1.0		04/29/99
1,4-Dichlorobenzene	ND	1.0		04/29/99
1,1-Dichloroethane	ND	1.0		04/29/99
1,2-Dichloroethane	ND	1.0		04/29/99
1,1-Dichloroethene	ND	1.0		04/29/99
cis-1,2-Dichloroethene	ND	1.0		04/29/99
trans-1,2-Dichloroethene	ND	1.0		04/29/99
1,2-Dichloropropane	ND	1.0		04/29/99
cis-1,3-Dichloropropene	ND	1.0		04/29/99
trans-1,3-Dichloropropene	ND	1.0		04/29/99
Ethylbenzene	ND	1.0		04/29/99
Methylene chloride	ND	1.0		04/29/99
1,1,2,2-Tetrachloroethane	ND	1.0		04/29/99
Tetrachloroethene	ND	1.0		04/29/99
Toluene	ND	1.0		04/29/99
1,1,1-Trichloroethane	ND	1.0		04/29/99
1,1,2-Trichloroethane	ND	1.0		04/29/99
Trichloroethene	ND	1.0		04/29/99
Trichlorofluoromethane	ND	2.0		04/29/99
Vinyl chloride	ND	2.0		04/29/99
m-Xylene & p-Xylene	ND	1.0		04/29/99
o-Xylene	ND	1.0		04/29/99

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	95	70-130	
1,2-Dichloroethane-d4	96	60-140	
Toluene-d8	99	70-130	

Batch ID: 9121102

Volatile Organics, GC/MS (8260B)

Laboratory Control Sample

Lab Sample ID: E9E010000-102C
Matrix: Water
Units: ug/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Benzene	10.0	9.52	95	70-130	
Chlorobenzene	10.0	10.1	101	70-130	
1,1-Dichloroethene	10.0	9.46	95	60-140	
Toluene	10.0	9.92	99	70-130	
Trichloroethene	10.0	9.55	96	70-130	
Surrogate					
Bromofluorobenzene	10.0	9.97	100	70-130	
1,2-Dichloroethane-d4	10.0	9.73	97	60-140	
Toluene-d8	10.0	10.4	104	70-130	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D270200-001S
Matrix: Water
Units: ug/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Benzene	ND	10.0	9.33	9.10	93	91	70-130	2.6		
Chlorobenzene	ND	10.0	9.91	9.93	99	99	70-130	0.23		
1,1-Dichloroethene	ND	10.0	9.72	9.46	97	95	60-140	2.7		
Toluene	ND	10.0	9.58	9.54	96	95	70-130	0.40		
Trichloroethene	ND	10.0	10.2	9.86	102	99	70-130	2.8		
Surrogate										
Bromofluorobenzene	10	10.0	10.7	11.0	107	110	70-130			
1,2-Dichloroethane-d4	11	10.0	12.5	12.4	125	124	60-140			
Toluene-d8	10	10.0	10.3	10.4	103	104	70-130			

Précis
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Quality Control Reports

Batch ID: 9121153

Volatile Organics, GC/MS (8260B)

Method Blank

Lab Sample ID: E9E010000-153B
Matrix: Water
Units: ug/L

Analyte	Result	RL	Qual.	Date Analyzed
Benzene	ND	1.0		04/30/99
Bromodichloromethane	ND	1.0		04/30/99
Bromoform	ND	1.0		04/30/99
Bromomethane	ND	2.0		04/30/99
Carbon tetrachloride	ND	1.0		04/30/99
Chlorobenzene	ND	1.0		04/30/99
Dibromochloromethane	ND	1.0		04/30/99
Chloroethane	ND	2.0		04/30/99
Chloroform	ND	1.0		04/30/99
Chloromethane	ND	2.0		04/30/99
1,2-Dichlorobenzene	ND	1.0		04/30/99
1,3-Dichlorobenzene	ND	1.0		04/30/99
1,4-Dichlorobenzene	ND	1.0		04/30/99
1,1-Dichloroethane	ND	1.0		04/30/99
1,2-Dichloroethane	ND	1.0		04/30/99
1,1-Dichloroethene	ND	1.0		04/30/99
cis-1,2-Dichloroethene	ND	1.0		04/30/99
trans-1,2-Dichloroethene	ND	1.0		04/30/99
1,2-Dichloropropane	ND	1.0		04/30/99
cis-1,3-Dichloropropene	ND	1.0		04/30/99
trans-1,3-Dichloropropene	ND	1.0		04/30/99
Ethylbenzene	ND	1.0		04/30/99
Methylene chloride	ND	1.0		04/30/99
1,1,2,2-Tetrachloroethane	ND	1.0		04/30/99
Tetrachloroethene	ND	1.0		04/30/99
Toluene	ND	1.0		04/30/99
1,1,1-Trichloroethane	ND	1.0		04/30/99
1,1,2-Trichloroethane	ND	1.0		04/30/99
Trichloroethene	ND	1.0		04/30/99
Trichlorofluoromethane	ND	2.0		04/30/99
Vinyl chloride	ND	2.0		04/30/99
m-Xylene & p-Xylene	ND	1.0		04/30/99
o-Xylene	ND	1.0		04/30/99

Surrogate	% Rec.	Acceptance Limit	Qualifier
Bromofluorobenzene	102	70-130	
1,2-Dichloroethane-d4	123	60-140	
Toluene-d8	99	70-130	

Batch ID: 9121153

Volatile Organics, GC/MS (8260B)

Laboratory Control Sample

Lab Sample ID: E9E010000-153C
Matrix: Water
Units: ug/L

Analyte	Spike Amount	Result	% Rec.	QC Limits	Qual.
Benzene	10.0	9.12	91	70-130	
Chlorobenzene	10.0	10.1	101	70-130	
1,1-Dichloroethene	10.0	10.2	102	60-140	
Toluene	10.0	9.64	96	70-130	
Trichloroethene	10.0	9.72	97	70-130	
Surrogate					
Bromofluorobenzene	10.0	10.3	103	70-130	
1,2-Dichloroethane-d4	10.0	10.8	108	60-140	
Toluene-d8	10.0	10.3	103	70-130	

Matrix Spike / Matrix Spike Duplicate

Lab Sample ID E9D300167-002S
Matrix: Water
Units: ug/L

Analyte	Sample Result	Spike Amount	Result MS	Result MSD	% Rec. MS	% Rec. MSD	Control Limits	RPD	Qualifier MS	Qualifier MSD
Benzene	ND	10.0	7.42	7.98	74	80	70-130	7.3		
Chlorobenzene	ND	10.0	8.22	8.83	82	88	70-130	7.1		
1,1-Dichloroethene	ND	10.0	8.22	9.22	82	92	60-140	11		
Toluene	ND	10.0	7.58	8.13	76	81	70-130	7.0		
Trichloroethene	ND	10.0	8.69	9.09	87	91	70-130	4.5		
Surrogate										
Bromofluorobenzene	10	10.0	10.5	10.5	105	105	70-130			
1,2-Dichloroethane-d4	12	10.0	13.5	13.4	135	134	60-140			
Toluene-d8	10	10.0	8.63	8.94	86	89	70-130			

Quanterra
Environmental
Services
Précis Product

Subcontract Analyses

Classical Chemistry

May 29, 1997 ELAP No.: 1838

Quanterra Environmental Services
1721 South Grand Avenue
Santa Ana, CA 92705

ATTN: Sharon Meves

Client's Project: N/A
Lab No.: 35201-001/007

Enclosed are the results for sample(s) received by Advanced Technology Laboratories and tested for the parameters indicated in the enclosed chain of custody.

Thank you for the opportunity to service the needs of your company. Please feel free to call me at (562) 989 - 4045 if I can be of further assistance to your company.

Sincerely,

Cheryl de los Reyes
Technical Operations Manager
CDR/jh

Enclosures

This cover letter is an integral part of this analytical report.

This report pertains only to the samples investigated and does not necessarily apply to other apparently identical or similar materials. This report is submitted for the exclusive use of the client to whom it is addressed. Any reproduction of this report or use of this Laboratory's name for advertising or publicity purpose without authorization is prohibited.

Client: Quanterra Environmental Services
Attn: Sharon Meves

Client's Project N/A

Date Received: 04/26/99
Date Sampled: 04/26/99

Lab No.	Sample I.D.	Analysis	Date Analyzed	Results	Matrix, Units	MDL	DLR	Analyst
35201-001	PTI-MW145-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-002	PTI-MW155-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-003	PTI-MW150-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-004	PTI-MW16-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-005	PTI-EB02-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-006	PTI-MW09-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-007	PTI-MW37-043	EPA 7196A (Hexavalent Chromium)	04/26/99	ND	Water, mg/L	0.01	0.01	CM/NS
35201-001	PTI-MW145-043	EPA 150.1 (pH)	04/26/99	7.11	Water, pH units	---	---	RAL
35201-002	PTI-MW155-043	EPA 150.1 (pH)	04/26/99	7.20	Water, pH units	---	---	RAL
35201-003	PTI-MW150-043	EPA 150.1 (pH)	04/26/99	7.34	Water, pH units	---	---	RAL
35201-004	PTI-MW16-043	EPA 150.1 (pH)	04/26/99	6.90	Water, pH units	---	---	RAL
35201-005	PTI-EB02-043	EPA 150.1 (pH)	04/26/99	6.66	Water, pH units	---	---	RAL
35201-006	PTI-MW09-043	EPA 150.1 (pH)	04/26/99	6.70	Water, pH units	---	---	RAL
35201-007	PTI-MW37-043	EPA 150.1 (pH)	04/26/99	6.91	Water, pH units	---	---	RAL

MDL = Method Detection Limit
ND = Not Detected (Below DLR)
DF = Dilution Factor (DLR/MDL)

Reviewed/Approved By: _____ Date: 4/27/99

Cheryl de los Reyes
Technical Operations Manager

The cover letter is an integral part of this analytical report.

Advanced Technology Laboratories
1510 E. 33rd Street Signal Hill, CA 90807 Tel: 562 989-4045 Fax: 562 989-4040

Spike Recovery and RPD Summary Report

Method: EPA 7196A
Analyst: NS/CM
Data File: 9116-1W

Date: 04/26/99
Sample ID: BLANK
Matrix: Water
QC Batch: CR6+990426W-1

ANALYTE	UNITS	LCS Conc	LCS Res	% Rec	METH BL	SPL CONC	SPK ADDED	MS RSLT	MSD RSLT	%MS REC	MSD RE	REC Limit	RPD	PD Lim	MDL
Hex Chrome	mg/L	0.50	0.55	110	ND	ND	0.50	0.52	0.51	104	102	80-120	2	20	0.01

Approved by: _____
Liping Liu
Inorganics Supervisor

Date: 4/27/99

Advanced Technology

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
QUANTERRA INC		4-26-99	22765
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** 1 of 1
1721 S. Grand Ave	1-(714) 258-8610		
City / **State** / **Zip Code**	**Site Contact**		
Sta Ana / CA / 92705			
Project Name	**Carrier/Waybill Number**		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: Cr+6, PH
PTI-MW145-043	4-26-99								/
PTI-MW155-043	4-26-99								/
PTI-MW150-043	4-26-99								/
PTI-MW16-043	4-26-99								/
PTI-EB03-043	4-26-99								/
PTI-MW09-043	4-26-99								/
PTI-MW37-043	4-26-99								/
PB									

Special Instructions

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required
☐ Normal ☐ Rush

QC Level
☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Date	Time		Date	Time
1. Relinquished By: R Banfield	4-26-99	1615	1. Received By:	4/26/99	16:15
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Appendix C
Completed COC Forms

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
CDM	Sharon Wallin	4-20-99	23192
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
18881 Von Karman Ave # 650	949-752-5452 / 949 752 1307		
City / State / Zip Code	**Site Contact**		
Irvine Ca 92612	Ed Vigil		
Project Name	**Carrier/Waybill Number**		
PTI			
Contract/Purchase Order/Quote No.			
2279-11462-111.FLD			

Analysis

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	8260	Cr, Cu, Cd	Cr+6 pH	
PTI-DE-043	4-20-99	11:20	GW	3x40ml	VOA	3	HCl		X			
" "				250 ml	poly	1	None				X	F
				500 ml	poly	1	HNO_3			X		
MW15												← Filtered in field 24 hour hold time
PTI-DE-043	4-20-99	12:55	GW	3x40ml	VOA	3	HCl		X			
" " "				250 ml	poly	1	None				X	F
" " "				500 ml	poly	1	HNO_3			X		
												← Filtered in field 24 hr hold time
PTI-MW10-043	4-20-99	13:45	GW	3x40ml	VOA	3	HCl		X			
" "				250 ml	poly	1	None				X	F
" "				500 ml	poly	1	HNO_3			V		
	↓ RL		↓ RL									← filtered in field 24 hr hold time
PTI-MW03-043	4-20-99	14:40	GW	3x40ml	VOA	3	HCl		X			
				250 ml	poly	1	None				X	F
				500 ml	poly	1	HNO_3			X		
												← filtered in field
PTI-TB01-043		—	water	3x40ml	VOA	3	HCl		X			24 hour hold time

Special Instructions

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required

☒ Normal ☐ Rush

QC Level

☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	Robert A Jeong	4-20-99	14:55	P Bautista	4-20-99	1455
2.	P Bautista	4-20-99	16:06	Rodeyan Lott	4/20/99	1600
3.						

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser & McKee	Sharon Wallin	4-23-99	23193
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 2**
18881 Von Karmen	949 752-5452 752-1307		
City / **State** / **Zip Code**	**Site Contact**		
Irvine / Ca / 92612	Ed Vigil		
Project Name	**Carrier/Waybill Number**		
PTI			
Contract/Purchase Order/Quote No.			
2279-11462-111.FLD			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: 8260	Cr, Cd, Cu	Cr+6, pH	
PTI-MW11-043	4-23-98	9:05	GW	120 ml	VOAs	3	HCl		X			
" "				500 ml	poly	1	HNO_3			X		Filter in field
" "				125	poly	1	None				X	24 hr hold time
PTI-MW06B-043	4-23-98	10:15		120 ml	VOA	3	HCl		X			
" "				500 ml	poly	1	HNO_3			X		Filtered in field
" "				125 ml	poly	1	None				X	24 hr hold time
PTI-MW06D-043	4-23-98	11:10		120 ml	VOA	3	HCl		X			
" "				500 ml	poly	1	HNO_3			X		Filtered in field
" "				125 ml	poly	1	None				X	24 hr hold time
PTI-MW07-043	4-23-98	12:30		120 ml	VOA	3	HCl		X			
" "				500 ml	poly	1	HNO_3			X		Filtered in field
" "				125 ml	poly	1	None				X	24 hr hold time
PTI-EB01-043	4-23-98	10:44		120 ml	VOA	3	HCl		X			
" "				500 ml	poly	1	HNO_3			X		Filtered in field
" "				125 ml	poly	1	None				X	24 hr hold time

Special Instructions

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required: ☒ Normal ☐ Rush

QC Level: ☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	Rofel Ortiz	4-23-99	15:33	P Bautista	4-23-99	1533
2.	P Bautista	4-23-99	1640	Wolfgang Rutt	4/23/99	1640
3.						

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser & McKee	Sharon Wallin	4-23-99	23194
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 2 of 2**
18881 Von Karman Ave #650	949-752-5452 752-1307		
City / **State** / **Zip Code**	**Site Contact**		
Irvine / Ca / 92612	Ed Vigil		
Project Name	**Carrier/Waybill Number**		
PTI			
Contract/Purchase Order/Quote No.			
2279-11462-111.FLD			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: 8240	Cr cld	Cr 6+	Analysis
PTI-MW04A-043	4-23-99	1420	GW	120 ml	VOA	3	HCl		X			
↓	↓	↓	↓	500 ml	poly	1	HNO_3			X		Filtered in field
↓	↓	↓	↓	125 ml	poly	1	NaOH				X	24 hr hold time
PTI-MW04-043	4-23-99	15:20		120 ml	VOA	3	HCl		X			
↓ MW4 DUP	↓	↓		500 ml	poly	1	HNO_3			X		Filtered in field
↓	↓	↓	↓	125 ml	poly	1	NONE				X	24 hr hold time
PTI-MW35-043	4-23-99	13:10		120 ml	VOA	3	HCl		X			
↓	↓	↓	↓	500 ml	poly	1	HNO_3			X		Filtered in field
↓	↓	↓	↓	125 ml	poly	1	NaOH				X	24 hr hold time
PTI-TB02-043	4-23-99	—	—	120 ml	VOA	3	HCl		X			

Special Instructions

Possible Hazard Identification	Sample Disposal
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Turn Around Time Required	**QC Level**	**Project Specific (Specify)**
☒ Normal ☐ Rush	☐ I. ☐ II. ☐ III.	

	Relinquished By	Date	Time	Received By	Date	Time
1.	[signature]	4-23-99	15:30	[signature]	4-23-99	1530
2.	[signature]	4-23-99	1640	[signature]	4/23/99	1640
3.						

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra

QUA-4124 0797

Client: Camp Dresser & McKee	Project Manager: Sharon Wallin	Date: 4/26/99	Chain of Custody Number: 08339
Address: 18881 Von Karman Ave #650	Telephone Number (Area Code)/Fax Number: 949 752-5452 / 752-1307	Lab Number:	Page 1 of 2
City: Irvine State: CA Zip Code: 92612	Site Contact: Ed Vigil Lab Contact: Diane Suzuki		
Project Name: PTI	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.: 2279-11462-FLD-FIEL			

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Matrix: Sed.	Matrix: Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cr Cd	Cr+6 pH	Special Instructions/ Conditions of Receipt
PTI-MW14S-043	4/26/99	9:25	X						X			X			
" "	↓	↓	X					X					X		← filtered in field
" "	↓	↓	X			X	~~X~~	RL						X	← 24 hr holding time
PTI-MW15S-043	4-26-99	10:20	X						X			X			
" "	↓	↓	X					X					X		← filtered in field
" "	↓	↓	X			X	~~X~~	RL						X	← 24 hr holding time
PTI-MW15D-043	4-26-99	11:23	X						X			X			
" "	↓	↓	X					X					X		filtered in field
" "	↓	↓	X			X	~~X~~	RL						X	24 hr holding time
PTI-MW16-043	4/26/99	12:55	X						X			X			
" " "	↓	↓	X					X					X		field filtered
" " "	↓	↓	X			X								X	24 hr hold time

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☒ 14 Days (Normal) ☐ 21 Days ☐ Other____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: [signature]	4-26-99	1510	1. Received By: [signature]	4-26-99	1510
2. Relinquished By:			2. Received By: [signature]	4/26/99	1730
3. Relinquished By:			3. Received By:		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number
Camp Dresser & Mckee	Sharon Wallin	4-26-99	08340
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 2 of 2**
18881 VonKarman Ave #650	949 752-5452 / 752-1307		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Irvine / Ca / 92612	Ed Vigil	Diane Suzuki	
Project Name	**Carrier/Waybill Number**		
PII			
Contract/Purchase Order/Quote No.			
2279-11462-FLD-FIEL			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis: EPA 8260	Cu Cr Ni	Cr+6 pH	Special Instructions/ Conditions of Receipt
PTI-EB02-043	4-26-99	13:15	X						X			X			
" "			X					X					X		← filtered in field
" "	↓	↓	X			X								Y	← 24 hr hold time
PTI-MW09-043	4-26-99	14:25	X						X			X			
" "			X					X					X		← filtered in field
" "	↓	↓	X			X								X	← 24 hr hold time
PTI-MW33-043	4-26-99	8:10	X						X			X			
" "			X					X					X		← filtered in field
" "	↓	↓	X			X								X	← 24 hr hold time
PTI-TB03-043	—	—	X						X			X			

Possible Hazard Identification: [X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison B [ ] Unknown

Sample Disposal: [ ] Return To Client [X] Disposal By Lab [ ] Archive For ____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: [ ] 24 Hours [ ] 48 Hours [ ] 7 Days [X] 14 Days Normal [ ] 21 Days [ ] Other ____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: Robert A Sayles	4-26-99	1510	1. Received By: P Bautista	4-26-99	1510 PB
2. Relinquished By: P Bautista	4-26-99	1730	2. Received By: Jorlyn Nut	4/26/99	1730
3. Relinquished By:	Date	Time	3. Received By:	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Appendix D
Background Groundwater Concentrations

CITY OF SANTA FE SPRINGS

SANTA FE SPRINGS CITY COUNCIL

George Mannerino
Mayor

Patricia E. Morrison
Mayor Pro Tem

Louie Gonzales
Councilmember

Greig Peterson
Councilmember

Edward E. Sharp
Councilmember

SAFETY STANDARDS

There are two types of standards that protect your water supply. Primary standards address contaminants that could affect our health. Secondary standards regulate chemicals that affect the aesthetic qualities of water, such as taste, odor and appearance. Regulations establish a Maximum Contaminant Level (MCL) for each. Santa Fe Springs sees to it that MCLs are met, and corrected if they are exceeded. Not all chemicals are regulated with MCLs, but many more chemicals are being added to the compliance list each year by the Department of Health Services and the U.S. Environmental Protection Agency. California also requires monitoring of unregulated chemicals.

Water treatment procedures have all but eliminated water-borne diseases. Media reports of cryptosporidium in water have been over exaggerated and there is little if any chance of it being present.

While the public is not at risk, cryptosporidium can prove life-threatening to people with compromised immune systems - such as chemotherapy patients, organ and bone marrow recipients or people infected with HIV or AIDS. As a precaution, people with such conditions should consult their doctor or health care provider to prevent infection from all potential sources. They may also boil their water for five minutes before consumption as a further precaution.

UNDERSTANDING THE WATER QUALITY REPORT

The information on the chart shows the results for various water quality analysis conducted during the year. When reading the list, you will note that Santa Fe Springs' water supply is of better quality than required by Federal and State standards.

This report is an important part of the City of Santa Fe Springs' ongoing water quality effort as required by the California Department of Health Services. If you have any questions about this information, please call 868-0511.

LEGEND

mg/l	=	MILLIGRAMS PER LITER (Parts per million)
ug/l	=	MICROGRAMS PER LITER (Parts per billion)
umhos/cm	=	MICROMHOS PER CENTIMETER
MCL	=	MAXIMUM CONTAMINANT LEVEL
MFL	=	MILLION FIBERS PER LITER (Longer than 10 um)
ND	=	NONE DETECTED
pCi/l	=	picaCuries PER LITER
NA	=	NOT ANALYZED
NR	=	NOT REQUIRED FOR COMPLIANCE PURPOSES
NC	=	NOT COLLECTED
W	=	MONITORING IS WAIVED (Based on vulnerability assessment, historic data and source susceptibility)

(a) Monitoring was completed for unregulated organics in addition to the regulated constituents listed. Results for all constituents were below detection levels unless otherwise noted.

(b) Fluoride results and MCL's are temperature dependent.

(c) Samples for this constituent were collected from points in the distribution system.

(d) The Metropolitan Water District of Southern California, which supplies the surface water, has developed a more accurate method to detect odors. This information is available upon request from the Metropolitan Water District.

(e) Action level based on sample results at customer tap.

(f) Secondary MCL indicated in parentheses.

CONSTITUENTS(a)	GROUNDWATER AVERAGE	GROUNDWATER RANGE	SURFACE WATER AVERAGE	SURFACE WATER RANGE	MCL (b)
GENERAL MINERAL - mg/l					
TOTAL HARDNESS	249	37-338	286	249-327	—
CALCIUM	72	15-99	69	60-80	—
MAGNESIUM	19	ND-35	28	24-32	—
SODIUM	75	39-136	97	86-112	—
POTASSIUM	3.1	1.4-4.2	4.5	3.9-5.1	—
TOTAL ALKALINITY (as CaCO3)	163	104-185	116	103-132	—
SULFATE	154	59-290	246	206-294	250-600 (f)
CHLORIDE	55	18-88	91	80-102	250-600 (f)
NITRATE (as NO3)	3.3	ND-12.0	.95	ND-1.63	45
NITRITE (as N)	ND	ND	ND	ND	1
FLUORIDE	0.47(b)	0.29-1.00	0.23	0.17-0.28	1.4-2.4
COPPER	0.13	ND-0.467	ND	ND	1 (e)
IRON	0.121	ND-0.525	ND	ND	0.3 (f)
MANGANESE	0.008	ND-0.031	ND	ND	0.05 (f)
ZINC	ND	ND	ND	ND	5 (f)
FOAMING AGENT (MBAS)	ND	ND	ND	ND	0.5 (f)
TOTAL DISSOLVED SOLIDS	500	250-739	617	541-715	500-1500(f)
GENERAL PHYSICAL					
pH (std unit)	8.0	7.9-8.5	8.04	8.00-8.08	6.5-8.5 (f)
SPECIFIC CONDUCTANCE (umhos/cm)	771	390-1130	991	896-1114	900-2200(f)
UNITS OF COLOR	ND (c)	ND-5	2.5	1.0-4.0	15 (f)
THRESHOLD ODOR NO. (TON)	1 (c)	1-2	(d)	(d)	3 (f)
TURBIDITY (ntu)	0.14(c)	0.10-0.90	0.08	0.06-0.10	5 (f)
RADIOLOGICAL - pCi/l					
GROSS ALPHA	1.6	ND-6.3	6.6	ND-11.7	15
URANIUM	5.3	4.0-6.0	4.6	3.3-5.7	20
GROSS BETA	NR	NR	7.3	1.2-11.2	50
INORGANICS - mg/l					
ANTIMONY	ND	ND	ND	ND	0.006
ARSENIC	NO	ND-0.002	0.002	ND-0.003	0.05
ASBESTOS	W	W	ND	ND	7 MFL
BARIUM	0.018	ND-0.110	0.12	0.11-0.13	1
BERYLLIUM	NO	NO	NO	NO	0.004
CADMIUM	ND	ND	ND	ND	0.005
CHROMIUM	ND	NO	ND	ND	0.05
CYANIDE	W	W	ND	ND	0.2
LEAD	ND	ND-0.008	ND	ND	0.015 (e)
MERCURY	ND	NO	ND	ND	0.002
NICKEL	NO	ND	0.004	0.003-0.008	0.1
SELENIUM	NO	ND	ND	ND	0.05
SILVER	ND	ND	ND	ND	0.1
THALLIUM	ND	ND	ND	ND	0.002
ALUMINUM	NO	ND	0.165	0.093-0.214	1 (0.2) (f)
ORGANICS - ug/l					
2, 4-D	ND	ND	NO	ND	70
2, 4, 5-TP SILVEX	W	W	NA	NA	50
ALACHLOR	W	W	NO	ND	2
ATRAZINE	ND	ND	ND	ND	3
SIMAZINE	ND	ND	ND	ND	4
BENTAZON	W	W	ND	ND	18
BENZO (a) pyrene	W	W	ND	ND	0.2
CARBARYL	ND	ND	NA	NA	
CARBOFURAN	W	W	NO	ND	18
CHLORDANE	ND	ND	ND	ND	0.1
DALAPON	W	W	ND	ND	200
DINOSEB	W	W	ND	ND	7
DIQUAT	NO	ND	ND	ND	20
Di(2-ethylhexyl)adipate (DEHA)	W	W	ND	ND	400
Di(2-ethylhexyl)phthalate (DEHP)	W	W	ND	ND	4
ETHYLENE DIBROMIDE (EDB)	W	W	ND	ND	0.05
1, 2, DIBRDMO-3-CHLOROPROPANE (DBCP)	W	W	ND	ND	0.2
ENDOTHALL	W	W	ND	ND	100
ENDRIN	W	W	NO	ND	2.
GLYPHOSATE	ND	ND	ND	ND	700
HEPTACHLOR	W	W	ND	ND	0.01
HEPTACHLOR EPOXIDE	W	W	ND	ND	0.01
HEXACHLORDBENZENE	W	W	ND	ND	50
HEXACHLORDCYCLOPENTADIENE	W	W	NO	ND	50
LINDANE	W	W	ND	ND	0.2
METHDXYCHLOR	W	W	NO	ND	40
MOLINATE	W	W	ND	ND	20
OXAMYL (VYDATE)	W	W	NO	ND	200
PENTACHLOROPHENOL	W	W	NO	ND	1
PICLORAM	W	W	ND	ND	500
POLYCHLORINATED BIPHENYLS (PCB's)	W	W	ND	ND	0.5
THIOBENCARB	W	W	ND	ND	70
TOXAPHENE	W	W	ND	ND	3
2,3,7,8-TCDD (Dioxin)	W	W	ND	ND	3xE-8
TRIHALOMETHANES, TOTAL - TTHMS (c)	37.4	ND-96.0	38.5	20.0-64.0	100
BENZENE	ND	ND	ND	ND	1
CARBON TETRACHLORIDE	ND	ND	ND	ND	0.5
DICHLOROMETHANE	ND	ND	ND	ND	5
MONOCHLORDBENZENE	ND	ND	ND	ND	30
1,4-DICHLORDBENZENE	ND	ND	ND	ND	5
1,1-DICHLORDETHANE - 11DCA	ND	ND	ND	ND	5
1,2-DICHLORDETHANE - 12DCA	ND	ND	ND	ND	0.5
1,1-DICHLORDETHENE - 11DCE	NO	NO	ND	ND	6
cis-1,2-DICHLORDETHENE	ND	ND	ND	ND	6
trans-1,2-DICHLORDETHENE	ND	ND	ND	NO	10
1,2-DICHLORDPROPANE	ND	ND	ND	NO	5
1,3-DICHLORDPROPENE	ND	ND	ND	NO	0.5
ETHYLBENZENE	NO	ND	NO	ND	700
FLUDROTRICHLDROMETHANE - FREON 11	ND	ND	ND	ND	150
STYRENE	ND	NO	ND	ND	100
1,1,2,2-TETRACHLDROETHANE	ND	ND	ND	NO	1
TETRACHLDROETHENE - PCE	1.1	ND-4.8	ND	ND	5
1,2,4-TRICHLDROBENZENE	ND	NO	ND	ND	70
TOLUENE	ND	ND	ND	ND	150
1,1,1-TRICHLDROETHANE -1,1,1TCA	ND	ND	NO	ND	200
1,1,2-TRICHLDRDETHANE -1,1,2TCA	NO	ND	ND	ND	5
TRICHLDROETHENE - TCE	0.3	ND-1.2	ND	ND	5
TRICHLDROTRIFLUDROETHANE - FREON 113	ND	ND	NO	NO	1,200
VINYL CHLORIDE	ND	ND	ND	NO	0.5
XYLENES, TOTAL (m, p & o)	ND	ND	NO	ND	1750
COLIFORM BACTERIA (c)					
COLIFORM BACTERIA PA % POSITIVE	0	0	NA	NA	5
COLIFORM BACTERIA MF CFU/100mL	NC	NC	0.12	0-1.1	1
NO. OF ACUTE VIOLATIONS	0	0	0	0	0

Appendix E
Statistical Analysis

Appendix E-1
Calculation of Upper Tolerance Limits for Background

SUMMARY OF UPPER TOLERANCE LEVEL CALCULATIONS
Quarterly Background Data: January 1989 to April 1999
Southern California Chemical

POISSON DISTRIBUTED UPPER TOLERANCE LEVEL

COMPOUND	Hexa Chromium	Total Chromium	Cadmium	Copper	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Trichloroethene
Percent Detected	2.4	9.5	2.4	21.4	2.4	9.5	31.0	33.3	NOT
Sample number(n)	42	42	42	42	42	42	42	42	CALC.
Tn	0.5330	0.3931	0.1184	0.5848	12.6550	25.1050	39.7050	72.4550	
2Tn+2	3.07	2.79	2.24	3.17	27.31	52.21	81.41	146.91	
Chi Squared @95% of di	7.96	7.47	6.46	8.14	40.89	70.49	102.89	170.75	
lamda Tn	0.095	0.089	0.077	0.097	0.487	0.839	1.225	2.033	
Two time Lamda Tn	0.190	0.178	0.154	0.194	0.973	1.678	2.450	4.065	
Beta cov. @95%, deg fr.	2.43	2.38	2.27	2.45	4.64	6.15	7.57	10.08	
k, from 2k+2 deg fr.	0.22	0.19	0.13	0.23	1.32	2.08	2.78	4.04	

AITCHISON ADJUSTMENT AND CALCULATION OF UPPER TOLERANCE LEVELS

Number of ND(d)	NOT	38	NOT	33	NOT	38	29	28	NO ADJ. REQ.
Number of values(n)	CALC.	42	CALC.	42	CALC.	42	42	42	
Mean of det values		0.0485		0.028		1.800	1.400	4.925	
STD of det values		0.040		0.008		0.361	0.265	0.907	
Atch. Adj. mean/mean(1)		0.005		0.006		0.171	0.433	1.642	12.040
Atch. Adj. std./std. (1)		0.018		0.012		0.544	0.671	2.405	5.428
K for Tolerance Limit		2.292		2.292		2.292	2.292	2.292	1.000
Adjusted Tol. Limit		0.046		0.034		1.417	1.970	7.153	
Unadjusted Tol. Limit									17.469

(1) Unadjusted mean and std. used to compute upper tolerance level for TCE

Appendix E-2
Nonparametric ANOVA Results

IMPORT successfully completed.

IMPORT successfully completed.

SYSTAT Rectangular file O:\2279-111\Apr99\1-11.syd,
created Sat Jun 12, 1999 at 17:13:40, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	2085.500
MW-1S	42	1484.500

Mann-Whitney U test statistic = 1182.500
Probability is 0.003
Chi-square approximation = 9.026 with 1 df

R

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	1746.000
MW-1S	42	1824.000

Mann-Whitney U test statistic = 843.000
Probability is 0.626
Chi-square approximation = 0.237 with 1 df

A

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE

Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	1816.500
MW-1S	42	1753.500

Mann-Whitney U test statistic = 913.500
Probability is 0.734
Chi-square approximation = 0.116 with 1 df

A

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	2593.500
MW-1S	42	976.500

Mann-Whitney U test statistic = 1690.500
Probability is 0.000
Chi-square approximation = 53.920 with 1 df

R

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	1729.500
MW-1S	42	1840.500

Mann-Whitney U test statistic = 826.500
Probability is 0.457
Chi-square approximation = 0.554 with 1 df

A

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	2583.000

MW-1S 42 987.000
Mann-Whitney U test statistic = 1680.000
Probability is 0.000
Chi-square approximation = 50.995 with 1 df

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	1779.000
MW-1S	42	1791.000

Mann-Whitney U test statistic = 876.000
Probability is 0.940
Chi-square approximation = 0.006 with 1 df A

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 82 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	41	2286.500
MW-1S	41	1116.500

Mann-Whitney U test statistic = 1425.500
Probability is 0.000
Chi-square approximation = 32.428 with 1 df R

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-11	42	2390.000
MW-1S	42	1180.000

Mann-Whitney U test statistic = 1487.000
Probability is 0.000
Chi-square approximation = 30.193 with 1 df R

SYSTAT Rectangular file O:\2279-111\Apr99\1-14s.syd,
created Sat Jun 12, 1999 at 17:13:44, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1537.500
MW-1S	42	1388.500

Mann-Whitney U test statistic = 942.500
Probability is 0.003
Chi-square approximation = 8.890 with 1 df

R

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1329.500
MW-1S	42	1596.500

Mann-Whitney U test statistic = 734.500
Probability is 0.744
Chi-square approximation = 0.107 with 1 df

A

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1561.500
MW-1S	42	1364.500

Mann-Whitney U test statistic = 966.500
Probability is 0.003
Chi-square approximation = 9.115 with 1 df R

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1775.000
MW-1S	42	1151.000

Mann-Whitney U test statistic = 1180.000
Probability is 0.000
Chi-square approximation = 25.433 with 1 df R

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1585.000
MW-1S	42	1341.000

Mann-Whitney U test statistic = 990.000
Probability is 0.001
Chi-square approximation = 11.362 with 1 df R

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1989.000
MW-1S	42	937.000

Mann-Whitney U test statistic = 1394.000
Probability is 0.000
Chi-square approximation = 50.509 with 1 df R

The following results are for:

PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1861.000
MW-1S	42	1065.000

Mann-Whitney U test statistic = 1266.000
Probability is 0.000
Chi-square approximation = 39.450 with 1 df

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 74 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	33	1431.500
MW-1S	41	1343.500

Mann-Whitney U test statistic = 870.500
Probability is 0.010
Chi-square approximation = 6.618 with 1 df

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 76 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-14S	34	1552.500
MW-1S	42	1373.500

Mann-Whitney U test statistic = 957.500
Probability is 0.007
Chi-square approximation = 7.173 with 1 df

SYSTAT Rectangular file O:\2279-111\Apr99\1-15s.syd,
created Sat Jun 12, 1999 at 17:13:48, contains variables:

WELL$	PARAM_ID$	VALUE	LN_VALUE	HD_VALUE	HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1365.000
MW-1S	42	1638.000

Mann-Whitney U test statistic = 735.000
Probability is 1.000
Chi-square approximation = 0.000 with 1 df

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1447.000
MW-1S	42	1556.000

Mann-Whitney U test statistic = 817.000
Probability is 0.212
Chi-square approximation = 1.557 with 1 df

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1297.500
MW-1S	42	1705.500

Mann-Whitney U test statistic = 667.500
Probability is 0.352
Chi-square approximation = 0.867 with 1 df

The following results are for:

PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1631.500
MW-1S	42	1371.500

Mann-Whitney U test statistic = 1001.500
Probability is 0.004
Chi-square approximation = 8.365 with 1 df

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1348.500
MW-1S	42	1654.500

Mann-Whitney U test statistic = 718.500
Probability is 0.807
Chi-square approximation = 0.060 with 1 df

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	869.500
MW-1S	42	2133.500

Mann-Whitney U test statistic = 239.500
Probability is 0.000
Chi-square approximation = 25.722 with 1 df

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1507.000
MW-1S	42	1496.000

Mann-Whitney U test statistic = 877.000
Probability is 0.055
Chi-square approximation = 3.686 with 1 df

A

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 75 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	34	1432.000
MW-1S	41	1418.000

Mann-Whitney U test statistic = 837.000
Probability is 0.072
Chi-square approximation = 3.241 with 1 df

A

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 77 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-15S	35	1490.000
MW-1S	42	1513.000

Mann-Whitney U test statistic = 860.000
Probability is 0.177
Chi-square approximation = 1.822 with 1 df

H

SYSTAT Rectangular file O:\2279-111\Apr99\1-16.syd,
created Sat Jun 12, 1999 at 17:13:52, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-16	29	1337.500
MW-1S	42	1218.500

Mann-Whitney U test statistic = 902.500
Probability is 0.000
Chi-square approximation = 17.070 with 1 df

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-16	29	1037.000
MW-1S	42	1519.000

Mann-Whitney U test statistic = 602.000
Probability is 0.887
Chi-square approximation = 0.020 with 1 df

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-16	29	1035.500
MW-1S	42	1520.500

Mann-Whitney U test statistic = 600.500
Probability is 0.896
Chi-square approximation = 0.017 with 1 df

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-16	29	1536.500
MW-1S	42	1019.500

Mann-Whitney U test statistic = 1101.500
Probability is 0.000
Chi-square approximation = 35.364 with 1 df

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-16	29	977.500
MW-1S	42	1578.500

Mann-Whitney U test statistic = 542.500
Probability is 0.233
Chi-square approximation = 1.422 with 1 df

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-16	29	1630.500
MW-1S	42	925.500

Mann-Whitney U test statistic = 1195.500
Probability is 0.000
Chi-square approximation = 47.114 with 1 df

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum

MW-16 29 1025.000
MW-1S 42 1531.000
Mann-Whitney U test statistic = 590.000
Probability is 0.686
Chi-square approximation = 0.164 with 1 df

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 69 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-16 28 1296.000
MW-1S 41 1119.000
Mann-Whitney U test statistic = 890.000
Probability is 0.000
Chi-square approximation = 18.876 with 1 df

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Kruskal-Wallis One-Way Analysis of Variance for 71 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-16 29 1394.000
MW-1S 42 1162.000
Mann-Whitney U test statistic = 959.000
Probability is 0.000
Chi-square approximation = 17.641 with 1 df

SYSTAT Rectangular file O:\2279-111\Apr99\1-3.syd,
created Sat Jun 12, 1999 at 17:13:56, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases

Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1578.500
MW-3	42	1991.500

Mann-Whitney U test statistic = 675.500
Probability is 0.015
Chi-square approximation = 5.904 with 1 df

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1785.000
MW-3	42	1785.000

Mann-Whitney U test statistic = 882.000
Probability is 1.000
Chi-square approximation = 0.000 with 1 df

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1849.000
MW-3	42	1721.000

Mann-Whitney U test statistic = 946.000
Probability is 0.425
Chi-square approximation = 0.637 with 1 df

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum

MW-1S 42 1448.000
MW-3 42 2122.000
Mann-Whitney U test statistic = 545.000
Probability is 0.001
Chi-square approximation = 10.290 with 1 df

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1765.000
MW-3 42 1805.000
Mann-Whitney U test statistic = 862.000
Probability is 0.799
Chi-square approximation = 0.065 with 1 df

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1075.000
MW-3 42 2495.000
Mann-Whitney U test statistic = 172.000
Probability is 0.000
Chi-square approximation = 40.390 with 1 df

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1745.500
MW-3 42 1824.500
Mann-Whitney U test statistic = 842.500
Probability is 0.586
Chi-square approximation = 0.297 with 1 df

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 82 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	41	1430.500
MW-3	41	1972.500

Mann-Whitney U test statistic = 569.500
Probability is 0.002
Chi-square approximation = 9.513 with 1 df

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1548.500
MW-3	42	2021.500

Mann-Whitney U test statistic = 645.500
Probability is 0.025
Chi-square approximation = 5.020 with 1 df

SYSTAT Rectangular file O:\2279-111\Apr99\1-4.syd,
created Sat Jun 12, 1999 at 17:14:00, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1155.500

MW-4 42 2414.500
Mann-Whitney U test statistic = 252.500
Probability is 0.000
Chi-square approximation = 37.517 with 1 df

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	925.000
MW-4	42	2645.000

Mann-Whitney U test statistic = 22.000
Probability is 0.000
Chi-square approximation = 63.823 with 1 df

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1675.000
MW-4	42	1895.000

Mann-Whitney U test statistic = 772.000
Probability is 0.235
Chi-square approximation = 1.409 with 1 df

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1014.000
MW-4	42	2556.000

Mann-Whitney U test statistic = 111.000
Probability is 0.000
Chi-square approximation = 49.411 with 1 df

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	903.000
MW-4	42	2667.000

Mann-Whitney U test statistic = 0.000
Probability is 0.000
Chi-square approximation = 66.683 with 1 df

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	904.000
MW-4	42	2666.000

Mann-Whitney U test statistic = 1.000
Probability is 0.000
Chi-square approximation = 62.174 with 1 df

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	903.000
MW-4	42	2667.000

Mann-Whitney U test statistic = 0.000
Probability is 0.000
Chi-square approximation = 67.576 with 1 df

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)

MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 82 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	41	1038.500
MW-4	41	2364.500

Mann-Whitney U test statistic = 177.500
Probability is 0.000
Chi-square approximation = 42.412 with 1 df

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	972.500
MW-4	42	2597.500

Mann-Whitney U test statistic = 69.500
Probability is 0.000
Chi-square approximation = 54.268 with 1 df

SYSTAT Rectangular file O:\2279-111\Apr99\1-6B.syd,
created Sat Jun 12, 1999 at 17:14:04, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1668.000
MW-6B	38	1572.000

Mann-Whitney U test statistic = 765.000
Probability is 0.640
Chi-square approximation = 0.218 with 1 df

The following results are for:

PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1659.000
MW-6B	38	1581.000

Mann-Whitney U test statistic = 756.000
Probability is 0.540
Chi-square approximation = 0.375 with 1 df

A

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1794.000
MW-6B	38	1446.000

Mann-Whitney U test statistic = 891.000
Probability is 0.200
Chi-square approximation = 1.645 with 1 df

A

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1507.500
MW-6B	38	1732.500

Mann-Whitney U test statistic = 604.500
Probability is 0.045
Chi-square approximation = 4.018 with 1 df

R

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1754.500
MW-6B	38	1485.500

Mann-Whitney U test statistic = 851.500
Probability is 0.449
Chi-square approximation = 0.574 with 1 df

A

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1845.000
MW-6B	38	1395.000

Mann-Whitney U test statistic = 942.000
Probability is 0.165
Chi-square approximation = 1.927 with 1 df

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1528.000
MW-6B	38	1712.000

Mann-Whitney U test statistic = 625.000
Probability is 0.025
Chi-square approximation = 4.994 with 1 df

B

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 78 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	41	1421.500
MW-6B	37	1659.500

Mann-Whitney U test statistic = 560.500
Probability is 0.025
Chi-square approximation = 5.029 with 1 df

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Kruskal-Wallis One-Way Analysis of Variance for 80 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1549.000
MW-6B	38	1691.000

Mann-Whitney U test statistic = 646.000
Probability is 0.115
Chi-square approximation = 2.478 with 1 df

A

SYSTAT Rectangular file O:\2279-111\Apr99\1-7.syd,
created Sat Jun 12, 1999 at 17:14:10, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1449.000
MW-7	42	2121.000

Mann-Whitney U test statistic = 546.000
Probability is 0.000
Chi-square approximation = 12.853 with 1 df

R

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1748.500
MW-7	42	1821.500

Mann-Whitney U test statistic = 845.500
Probability is 0.633
Chi-square approximation = 0.228 with 1 df

A

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1578.500
MW-7	42	1991.500

Mann-Whitney U test statistic = 675.500
Probability is 0.033
Chi-square approximation = 4.558 with 1 df

R

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1458.500
MW-7	42	2111.500

Mann-Whitney U test statistic = 555.500
Probability is 0.002
Chi-square approximation = 9.754 with 1 df

R

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum

MW-1S 42 1799.500
MW-7 42 1770.500
Mann-Whitney U test statistic = 896.500
Probability is 0.853
Chi-square approximation = 0.034 with 1 df A

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 954.000
MW-7 42 2616.000
Mann-Whitney U test statistic = 51.000
Probability is 0.000
Chi-square approximation = 55.312 with 1 df R

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1688.500
MW-7 42 1881.500
Mann-Whitney U test statistic = 785.500
Probability is 0.219
Chi-square approximation = 1.513 with 1 df A

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 82 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 41 1465.500
MW-7 41 1937.500
Mann-Whitney U test statistic = 604.500
Probability is 0.006

Chi-square approximation = 7.416 with 1 df R

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1646.000
MW-7	42	1924.000

Mann-Whitney U test statistic = 743.000
Probability is 0.181
Chi-square approximation = 1.787 with 1 df A

SYSTAT Rectangular file O:\2279-111\Apr99\1-9.syd,
created Sat Jun 12, 1999 at 17:14:14, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

The following results are for:
PARAM_ID$ = BEN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1187.500
MW-9	42	2382.500

Mann-Whitney U test statistic = 284.500
Probability is 0.000
Chi-square approximation = 33.028 with 1 df R

The following results are for:
PARAM_ID$ = CD

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum

MW-1S 42 1748.500
MW-9 42 1821.500
Mann-Whitney U test statistic = 845.500
Probability is 0.633
Chi-square approximation = 0.228 with 1 df A

The following results are for:
PARAM_ID$ = CU

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1861.500
MW-9 42 1708.500
Mann-Whitney U test statistic = 958.500
Probability is 0.350
Chi-square approximation = 0.873 with 1 df A

The following results are for:
PARAM_ID$ = EBN

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1116.500
MW-9 42 2453.500
Mann-Whitney U test statistic = 213.500
Probability is 0.000
Chi-square approximation = 37.482 with 1 df R

The following results are for:
PARAM_ID$ = HCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group Count Rank Sum

MW-1S 42 1630.000
MW-9 42 1940.000
Mann-Whitney U test statistic = 727.000
Probability is 0.077
Chi-square approximation = 3.119 with 1 df A

The following results are for:
PARAM_ID$ = TCE

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	912.500
MW-9	42	2657.500

Mann-Whitney U test statistic = 9.500
Probability is 0.000
Chi-square approximation = 60.961 with 1 df R

The following results are for:
PARAM_ID$ = TCR

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1554.000
MW-9	42	2016.000

Mann-Whitney U test statistic = 651.000
Probability is 0.008
Chi-square approximation = 7.142 with 1 df R

The following results are for:
PARAM_ID$ = TOL

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 82 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	41	1099.500
MW-9	41	2303.500

Mann-Whitney U test statistic = 238.500
Probability is 0.000
Chi-square approximation = 35.275 with 1 df R

The following results are for:
PARAM_ID$ = TX

Categorical values encountered during processing are:

WELL$ (2 levels)
MW-1S, MW-9

Kruskal-Wallis One-Way Analysis of Variance for 84 cases
Dependent variable is VALUE
Grouping variable is WELL$

Group	Count	Rank Sum
MW-1S	42	1160.500
MW-9	42	2409.500

Mann-Whitney U test statistic = 257.500
Probability is 0.000
Chi-square approximation = 32.878 with 1 df

Appendix E-3
Parametric ANOVA Results

IMPORT successfully completed.

IMPORT successfully completed.

754 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-11.SYD,
created Sat Jun 12, 1999 at 17:13:40, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

Data for the following results were selected according to:
(PARAM_ID$= "TCE")

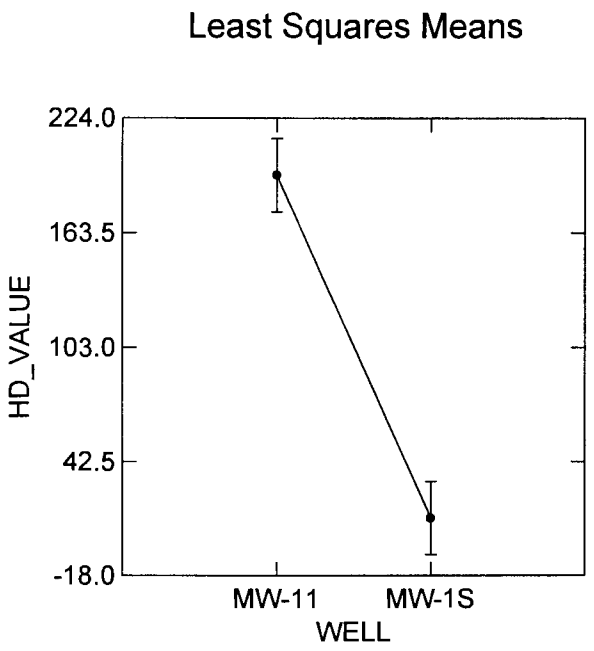
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Dep Var: HD_VALUE N: 84 Multiple R: 0.590 Squared multiple R: 0.349

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	692005.067	1	692005.067	43.898	0.000
Error	1292647.510	82	15763.994		




```
*** WARNING ***
Case          448 is an outlier          (Studentized Residual =        4.103)
Case          508 is an outlier          (Studentized Residual =        3.688)
Case          729 is an outlier          (Studentized Residual =        4.429)

Durbin-Watson D Statistic      1.476
First Order Autocorrelation    0.248
COL/
ROW WELL$
  1  MW-11
  2  MW-1S
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 15763.994 with 82 df.
Matrix of pairwise mean differences:

                    1           2
          1         0.000
          2      -181.529       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                    1           2
          1         1.000
          2         0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")
```

Effects coding used for categorical variables in model.

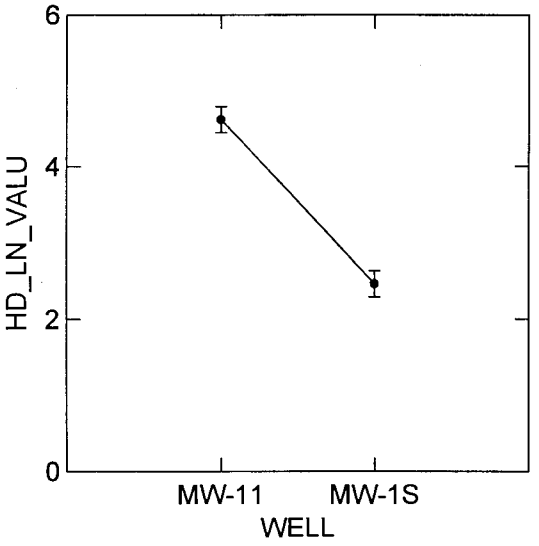
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-11, MW-1S

Dep Var: HD_LN_VALU N: 84 Multiple R: 0.701 Squared multiple R: 0.491

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	97.621	1	97.621	79.078	0.000
Error	101.228	82	1.234		

Least Squares Means



*** WARNING ***
Case 121 is an outlier (Studentized Residual = -5.686)
Case 122 is an outlier (Studentized Residual = -5.686)

Durbin-Watson D Statistic 0.892
First Order Autocorrelation 0.414
COL/
ROW WELL$
1 MW-11
2 MW-1S
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 1.234 with 82 df.
Matrix of pairwise mean differences:

	1	2
1	0.000	
2	-2.156	0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

	1	2
1	1.000	
2	0.000	1.000

IMPORT successfully completed.

682 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-14s.SYD,
created Sat Jun 12, 1999 at 17:13:44, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

Data for the following results were selected according to:
(PARAM_ID$= "TCE")

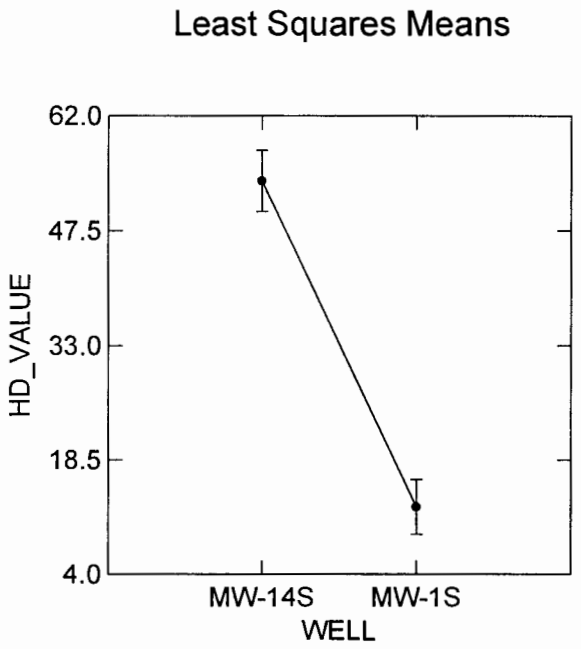
Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Dep Var: HD_VALUE N: 76 Multiple R: 0.679 Squared multiple R: 0.461

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	32055.974	1	32055.974	63.404	0.000
Error	37413.046	74	505.582		




```
*** WARNING ***
Case          102 is an outlier        (Studentized Residual =        7.549)

Durbin-Watson D Statistic     1.155
First Order Autocorrelation   0.402
COL/
ROW WELL$
  1  MW-14S
  2  MW-1S
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 505.582 with 74 df.
Matrix of pairwise mean differences:

                    1           2
          1         0.000
          2       -41.304       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                    1           2
          1         1.000
          2         0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.
```

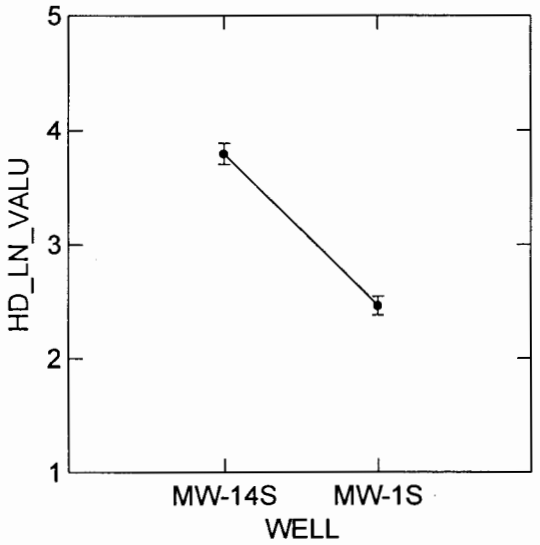
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-14S, MW-1S

Dep Var: HD_LN_VALU N: 76 Multiple R: 0.784 Squared multiple R: 0.615

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	33.427	1	33.427	118.227	0.000
Error	20.922	74	0.283		

Least Squares Means



Durbin-Watson D Statistic 1.161
First Order Autocorrelation 0.385
COL/
ROW WELL$
1 MW-14S
2 MW-1S
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.283 with 74 df.
Matrix of pairwise mean differences:

	1	2
1	0.000	

```
              2         -1.334       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                        1           2
              1         1.000
              2         0.000       1.000
-------------------------------------------------------------------------------
```

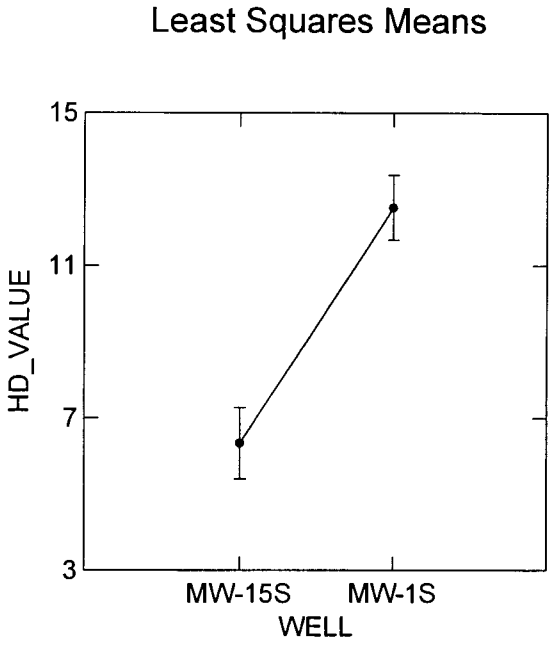
IMPORT successfully completed.

691 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-15s.SYD,
created Sat Jun 12, 1999 at 17:13:48, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
   MW-15S, MW-1S

Dep Var: HD_VALUE   N: 77   Multiple R: 0.491   Squared multiple R: 0.241

                          Analysis of Variance

Source             Sum-of-Squares   df  Mean-Square     F-ratio       P

WELL$                     729.577    1      729.577      23.833       0.000

Error                    2295.946   75       30.613
-------------------------------------------------------------------------------
```




```
*** WARNING ***
Case          102 is an outlier        (Studentized Residual =        4.441)

Durbin-Watson D Statistic     0.840
First Order Autocorrelation   0.566
COL/
ROW WELL$
  1  MW-15S
  2  MW-1S
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 30.613 with 75 df.
Matrix of pairwise mean differences:

                         1           2
             1           0.000
             2           6.182       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                         1           2
             1           1.000
             2           0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.
```

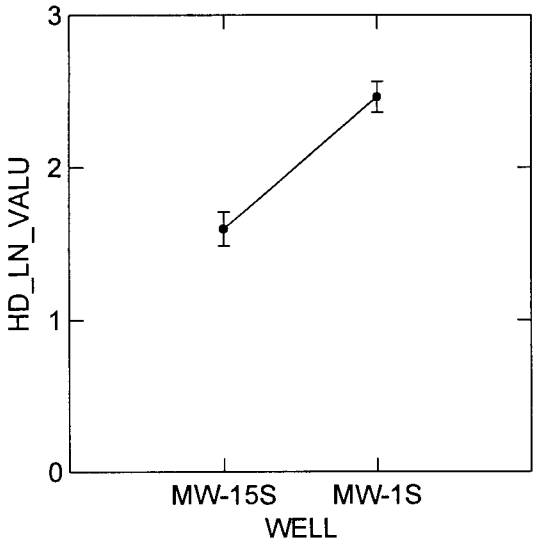
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-15S, MW-1S

Dep Var: HD_LN_VALU N: 77 Multiple R: 0.555 Squared multiple R: 0.308

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	14.238	1	14.238	33.404	0.000
Error	31.967	75	0.426		

Least Squares Means



*** WARNING ***
Case 86 is an outlier (Studentized Residual = -3.877)

Durbin-Watson D Statistic 0.682
First Order Autocorrelation 0.573
COL/
ROW WELL$
1 MW-15S
2 MW-1S
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.426 with 75 df.
Matrix of pairwise mean differences:

```
                        1           2
            1           0.000
            2           0.864       0.000

  Tukey HSD Multiple Comparisons.
  Matrix of pairwise comparison probabilities:

                        1           2
            1           1.000
            2           0.000       1.000
```

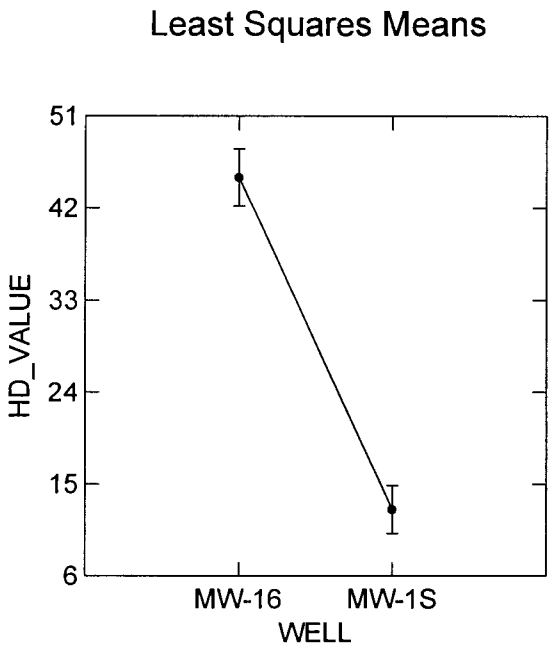
IMPORT successfully completed.

637 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-16.SYD,
created Sat Jun 12, 1999 at 17:13:52, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
  Data for the following results were selected according to:
        (PARAM_ID$= "TCE")

  Effects coding used for categorical variables in model.

  Categorical values encountered during processing are:
  WELL$ (2 levels)
     MW-16, MW-1S

  Dep Var: HD_VALUE   N: 71   Multiple R: 0.730   Squared multiple R: 0.533

                            Analysis of Variance

  Source              Sum-of-Squares   df  Mean-Square     F-ratio       P

  WELL$                    18098.661    1    18098.661      78.868       0.000

  Error                    15834.105   69      229.480
```




```
*** WARNING ***
Case           66 is an outlier          (Studentized Residual =        3.305)
Case          439 is an outlier          (Studentized Residual =        5.096)

Durbin-Watson D Statistic      1.375
First Order Autocorrelation    0.283
COL/
ROW WELL$
  1  MW-16
  2  MW-1S
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 229.480 with 69 df.
Matrix of pairwise mean differences:

                        1           2
             1          0.000
             2        -32.481       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                        1           2
             1          1.000
             2          0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")
```

Effects coding used for categorical variables in model.

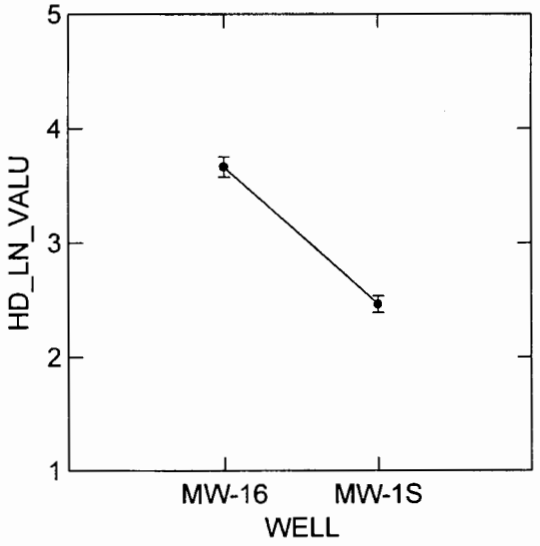
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-16, MW-1S

Dep Var: HD_LN_VALU N: 71 Multiple R: 0.779 Squared multiple R: 0.606

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	24.738	1	24.738	106.239	0.000
Error	16.067	69	0.233		

Least Squares Means



Durbin-Watson D Statistic 1.250
First Order Autocorrelation 0.339
COL/
ROW WELL$
1 MW-16
2 MW-1S
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.233 with 69 df.
Matrix of pairwise mean differences:

	1	2

```
               1          0.000
               2         -1.201       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                          1           2
               1          1.000
               2          0.000       1.000
-------------------------------------------------------------------------------
```

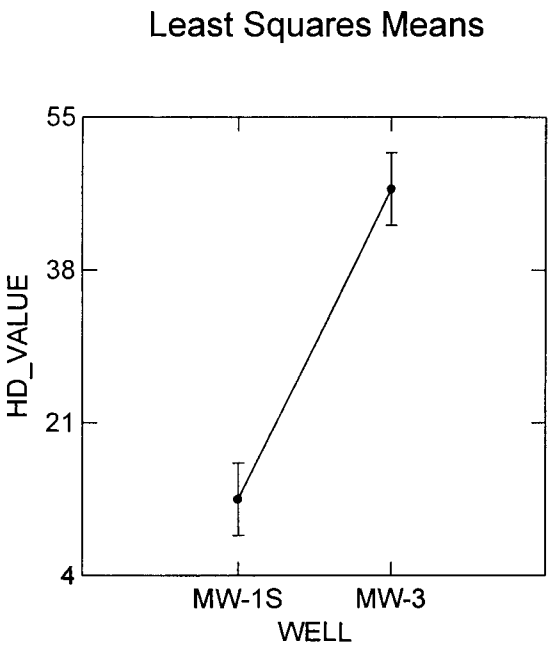
IMPORT successfully completed.

754 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-3.SYD,
created Sat Jun 12, 1999 at 17:13:56, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
   MW-1S, MW-3

Dep Var: HD_VALUE   N: 84   Multiple R: 0.557   Squared multiple R: 0.310


                            Analysis of Variance

Source              Sum-of-Squares   df  Mean-Square     F-ratio       P

WELL$                    25019.406    1    25019.406      36.860       0.000

Error                    55659.301   82      678.772

-------------------------------------------------------------------------------
```




```
*** WARNING ***
Case          357 is an outlier        (Studentized Residual =        3.428)
Case          358 is an outlier        (Studentized Residual =        3.428)
Case          359 is an outlier        (Studentized Residual =        3.428)

Durbin-Watson D Statistic     0.688
First Order Autocorrelation   0.649
COL/
ROW WELL$
  1  MW-1S
  2  MW-3
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 678.772 with 82 df.
Matrix of pairwise mean differences:

                    1           2
          1         0.000
          2        34.517       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                    1           2
          1         1.000
          2         0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")
```

Effects coding used for categorical variables in model.

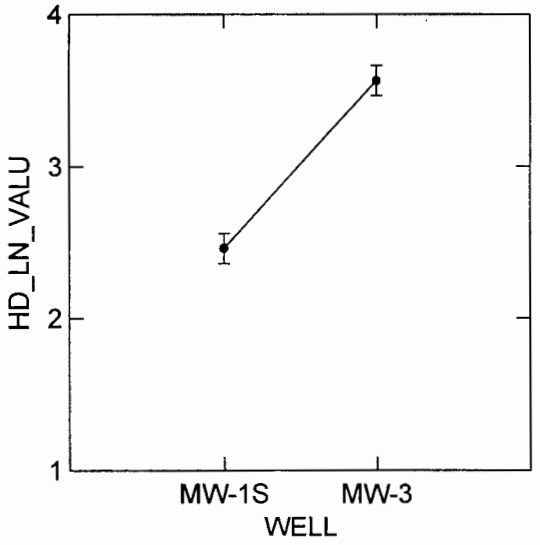
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-3

Dep Var: HD_LN_VALU N: 84 Multiple R: 0.658 Squared multiple R: 0.433

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	25.633	1	25.633	62.547	0.000
Error	33.606	82	0.410		

Least Squares Means



Durbin-Watson D Statistic 1.166
First Order Autocorrelation 0.405
COL/
ROW WELL$
1 MW-1S
2 MW-3
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.410 with 82 df.
Matrix of pairwise mean differences:

```
                        1           2
            1           0.000
            2           1.105       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                        1           2
            1           1.000
            2           0.000       1.000
-------------------------------------------------------------------------------
```

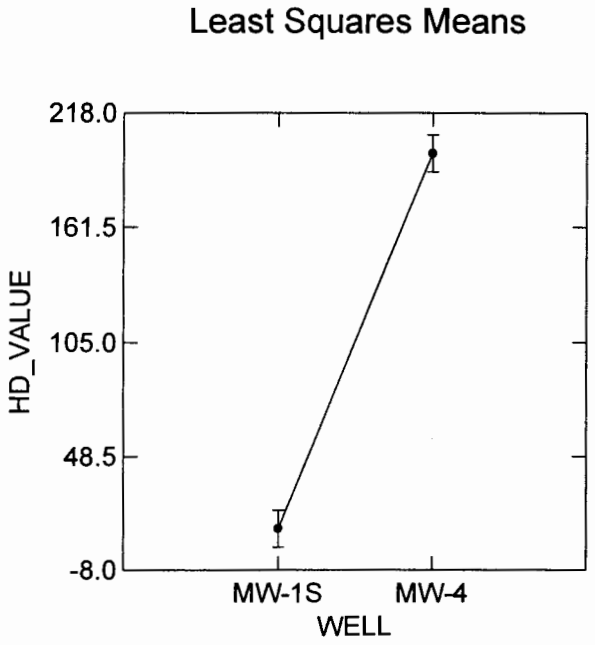
IMPORT successfully completed.

754 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-4.SYD,
created Sat Jun 12, 1999 at 17:14:00, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
   MW-1S, MW-4

Dep Var: HD_VALUE   N: 84   Multiple R: 0.845   Squared multiple R: 0.714

                          Analysis of Variance

Source              Sum-of-Squares   df  Mean-Square     F-ratio       P

WELL$                  722095.943     1   722095.943     204.358       0.000

Error                  289746.010    82     3533.488
-------------------------------------------------------------------------------
```




```
*** WARNING ***
Case          358 is an outlier        (Studentized Residual =        3.485)

Durbin-Watson D Statistic     1.084
First Order Autocorrelation   0.458
COL/
ROW WELL$
  1  MW-1S
  2  MW-4
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 3533.488 with 82 df.
Matrix of pairwise mean differences:

                         1           2
             1         0.000
             2       185.433       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                         1           2
             1         1.000
             2         0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.
```

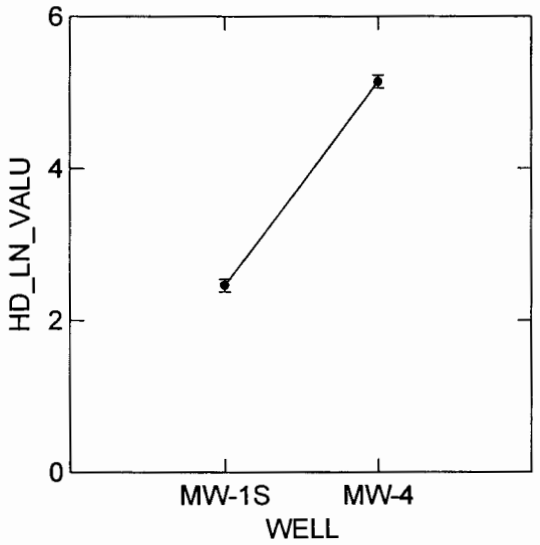
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-4

Dep Var: HD_LN_VALU N: 84 Multiple R: 0.929 Squared multiple R: 0.863

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	150.953	1	150.953	515.843	0.000
Error	23.996	82	0.293		

Least Squares Means



*** WARNING ***
Case 336 is an outlier (Studentized Residual = -3.896)
Case 712 is an outlier (Studentized Residual = -3.896)

Durbin-Watson D Statistic 1.548
First Order Autocorrelation 0.215
COL/
ROW WELL$
1 MW-1S
2 MW-4
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.293 with 82 df.
Matrix of pairwise mean differences:

```
                        1           2
              1         0.000
              2         2.681       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                        1           2
              1         1.000
              2         0.000       1.000
```

IMPORT successfully completed.

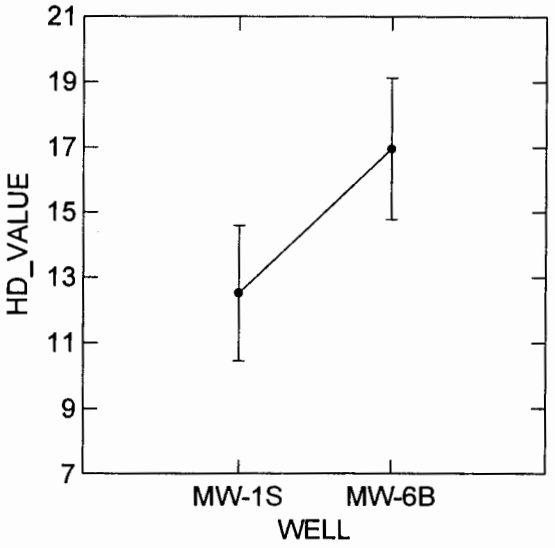
718 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-6B.SYD,
created Sat Jun 12, 1999 at 17:14:04, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
   MW-1S, MW-6B

Dep Var: HD_VALUE   N: 80   Multiple R: 0.165   Squared multiple R: 0.027

                          Analysis of Variance

Source              Sum-of-Squares   df  Mean-Square     F-ratio       P

WELL$                      392.151    1      392.151       2.181       0.144

Error                    14023.839   78      179.793
```

Least Squares Means




```
*** WARNING ***
Case          334 is an outlier        (Studentized Residual =        3.384)
Case          335 is an outlier        (Studentized Residual =        3.571)

Durbin-Watson D Statistic     0.528
First Order Autocorrelation   0.728
COL/
ROW WELL$
  1  MW-1S
  2  MW-6B
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 179.793 with 78 df.
Matrix of pairwise mean differences:

                    1           2
          1         0.000
          2         4.434       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                    1           2
          1         1.000
          2         0.144       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")
```

Effects coding used for categorical variables in model.

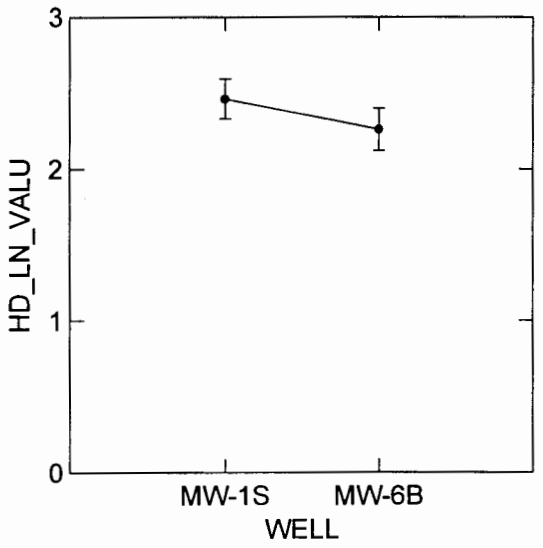
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-6B

Dep Var: HD_LN_VALU N: 80 Multiple R: 0.118 Squared multiple R: 0.014

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	0.806	1	0.806	1.104	0.297
Error	56.971	78	0.730		

Least Squares Means



Durbin-Watson D Statistic 0.780
First Order Autocorrelation 0.593
COL/
ROW WELL$
1 MW-1S
2 MW-6B
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.730 with 78 df.
Matrix of pairwise mean differences:

	1	2

```
              1          0.000
              2         -0.201        0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                          1             2
              1           1.000
              2           0.297         1.000
-------------------------------------------------------------------------------
```

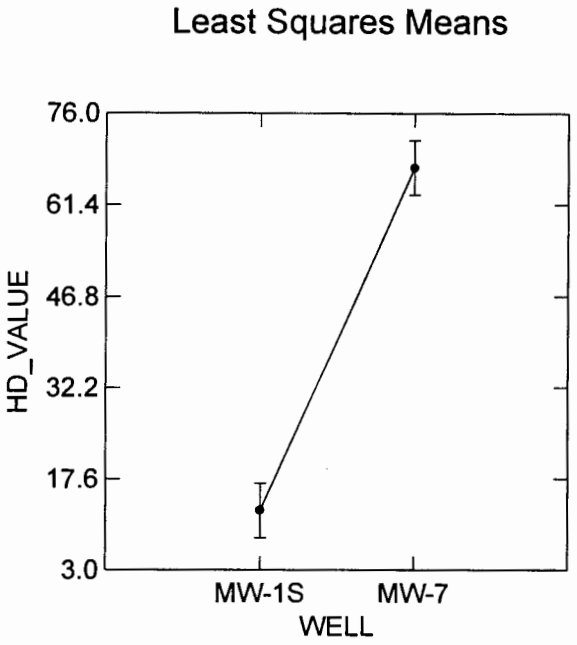
IMPORT successfully completed.

754 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-7.SYD,
created Sat Jun 12, 1999 at 17:14:10, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
   MW-1S, MW-7

Dep Var: HD_VALUE   N: 84   Multiple R: 0.701   Squared multiple R: 0.491

                            Analysis of Variance

Source              Sum-of-Squares   df  Mean-Square     F-ratio       P

WELL$                    63085.762    1    63085.762      79.017       0.000

Error                    65467.610   82      798.385

-------------------------------------------------------------------------------
```




```
*** WARNING ***
Case          448 is an outlier        (Studentized Residual =        4.000)
Case          730 is an outlier        (Studentized Residual =        3.546)

Durbin-Watson D Statistic     1.385
First Order Autocorrelation   0.306
COL/
ROW WELL$
  1  MW-1S
  2  MW-7
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 798.385 with 82 df.
Matrix of pairwise mean differences:

                         1           2
             1         0.000
             2        54.810       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                         1           2
             1         1.000
             2         0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")
```

Effects coding used for categorical variables in model.

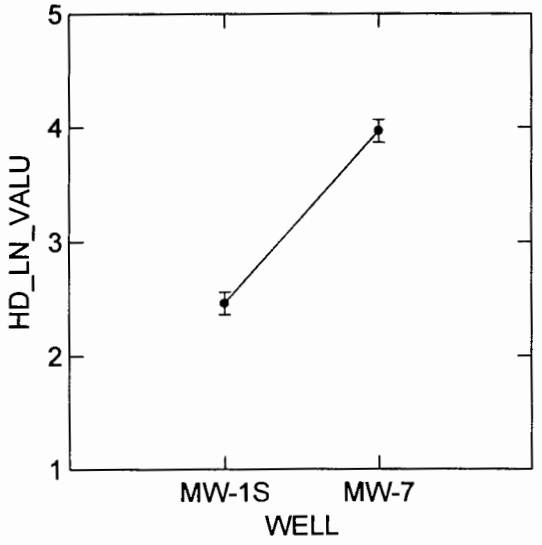
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-7

Dep Var: HD_LN_VALU N: 84 Multiple R: 0.763 Squared multiple R: 0.582

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	47.744	1	47.744	113.955	0.000
Error	34.356	82	0.419		

Least Squares Means



*** WARNING ***
Case 336 is an outlier (Studentized Residual = -6.470)

Durbin-Watson D Statistic 1.716
First Order Autocorrelation 0.132
COL/
ROW WELL$
1 MW-1S
2 MW-7
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.419 with 82 df.
Matrix of pairwise mean differences:

```
                    1           2
          1         0.000
          2         1.508       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                    1           2
          1         1.000
          2         0.000       1.000
```

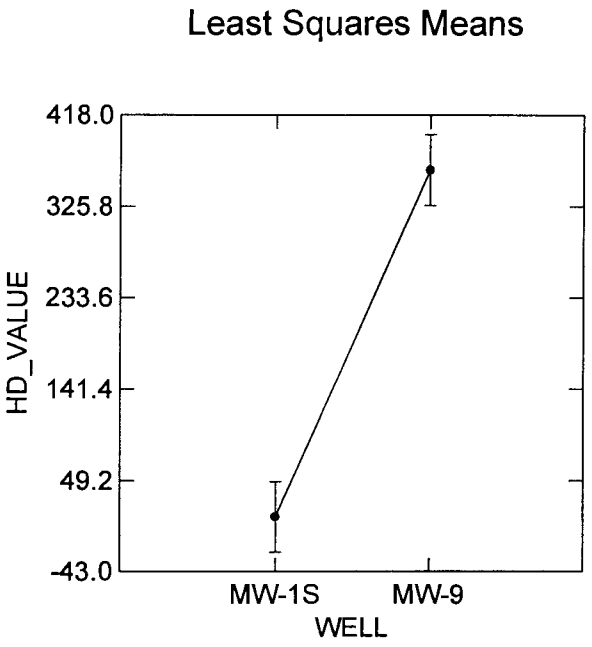
IMPORT successfully completed.

754 cases and 6 variables processed and saved.

SYSTAT Rectangular file O:\2279-111\Apr99\1-9.SYD,
created Sat Jun 12, 1999 at 17:14:14, contains variables:

WELL$ PARAM_ID$ VALUE LN_VALUE HD_VALUE HD_LN_VALU

```
Data for the following results were selected according to:
      (PARAM_ID$= "TCE")

Effects coding used for categorical variables in model.

Categorical values encountered during processing are:
WELL$ (2 levels)
   MW-1S, MW-9

Dep Var: HD_VALUE   N: 84   Multiple R: 0.607   Squared multiple R: 0.368

                          Analysis of Variance

Source             Sum-of-Squares   df  Mean-Square     F-ratio       P

WELL$                 2572920.017    1  2572920.017      47.839       0.000

Error                 4410178.510   82    53782.665
```




```
*** WARNING ***
Case          359 is an outlier          (Studentized Residual =        3.422)
Case          694 is an outlier          (Studentized Residual =        4.558)
Case          712 is an outlier          (Studentized Residual =        3.970)

Durbin-Watson D Statistic      1.312
First Order Autocorrelation    0.344
COL/
ROW WELL$
  1  MW-1S
  2  MW-9
Using least squares means.
Post Hoc test of HD_VALUE
-------------------------------------------------------------------------------

Using model MSE of 53782.665 with 82 df.
Matrix of pairwise mean differences:

                        1           2
             1          0.000
             2        350.029       0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

                        1           2
             1          1.000
             2          0.000       1.000
-------------------------------------------------------------------------------


Data for the following results were selected according to:
      (PARAM_ID$= "TCE")
```

Effects coding used for categorical variables in model.

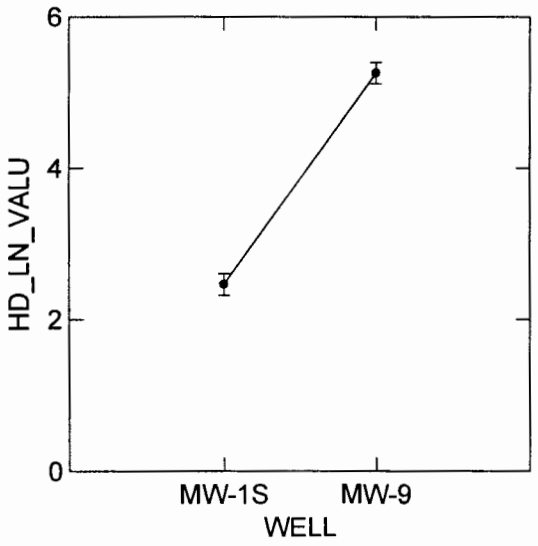
Categorical values encountered during processing are:
WELL$ (2 levels)
MW-1S, MW-9

Dep Var: HD_LN_VALU N: 84 Multiple R: 0.837 Squared multiple R: 0.701

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio	P
WELL$	164.244	1	164.244	192.128	0.000
Error	70.099	82	0.855		

Least Squares Means



Durbin-Watson D Statistic 1.261
First Order Autocorrelation 0.363
COL/
ROW WELL$
1 MW-1S
2 MW-9
Using least squares means.
Post Hoc test of HD_LN_VALU

Using model MSE of 0.855 with 82 df.
Matrix of pairwise mean differences:

	1	2
1	0.000	
2	2.797	0.000

Tukey HSD Multiple Comparisons.
Matrix of pairwise comparison probabilities:

	1	2
1	1.000	
2	0.000	1.000
